SudanUniversity of Science and Technology

College of Graduate studies

Evaluation of Benign Prostatic Hyper Plasia using ultrasonography

تقييم تضخم البرستاتا الحميد باستخدام الموجات فوق الصوتية

AthesisSubmitted For Partial Fulfillment of the(M.Sc) degree requirement in Medical Diagnostic Ultrasound

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الأيه

بسم الله الرحمن الرحيم

اللّه{ لاَ إِلَـهَ إِلاَّ هُوَ الْحَيُّ الْقَيُّومُ لاَ تَأْخُذُهُ سِنَةٌ وَلاَ نَوْمٌ لَّهُ مَا فِي
السَّمَاوَاتِ وَمَا فِي الأَرْضِ مَن ذَا الَّذِي يَشْفَعُ عِنْدَهُ إِلاَّ بِإِذْنِهِ يَعْلَمُ
مَا بَيْنَ أَيْدِيهِمْ وَمَا خَلْفَهُمْ وَلاَ يُحِيطُونَ بِشَيْءٍ مِّنْ عِلْمِهِ إِلاَّ بِمَا
شَاءَ وَسِعَ كُرْسِيُّهُ السَّمَاوَاتِ وَالأَرْضَ وَلاَ يَؤُودُهُ حِفْظُهُمَا وَهُوَ
الْعَلِيُّ الْعَظِيمُ }

سورة البقرة الآية 255

Dedication

- *To the soul of my father andmy mother.*
- *To my wife and daughters.*
- *To my brothers and family.*

ACKNOWLEDGMENT

I thank god for enabling me to complete this thesis.

I sincerely thank ***Dr.AsmaIbramaim Ahmed*** *, supervisor of my thesis for her continuous help supervision and guidance.*

I greatly thank all those who supported and helped me to complete this thesis.

Especially thanks for my colleagues at Ommdurman clinics

Very much thanks to ***Dr.AwadiaGareeballa.***

Abstract

This was cross sectional descriptive study was carried out in 53 patient refered to Om durman ultra soud depart ment from June (2016)to October(2116)with symptom of BPH and ultra sound examination was done using transabdominltransduser with different ultrasound machines.The objective of this study to evaluate benign prosatic hyper plasia using ultra sound.

This study showed that 53 patient their ages ranging between (42- 87) years and most affected age (61-70) Years (22)(41.5%).

Themeanprostate specificantigen (PSA)is(9,7)ng/mlrangingfrom(4)ng/ml to(26)ng/ml.

Son ographic appearance of 53 patient with BPH show the mean prostate volume is(83)g with normal capsule(33)(62,3%), hydronephrosis and calcification are least common in BPH patients(5)(9.4)%(11)(20.8)% respectively.

There was Strong positive correlation between pt age and prostate volume andStrong significant correlation between prostate specific antigen and prostate volume .

Finally the study findings revealed that (TAS) was an effective imaging modality in evaluate benign prostatic hyper plasia. The study recommended thatmore studies should be conducted using T.R.U.S

المستخلص

أجريت هذه الدراسهالوصفيه علىثلاثه و خمسين مريض بتضخم البروستاتا الحميد محولين الى اقسام المجاتالصوتيهبام درمانفىالفتره من يونيو (2016)الى أكتوبر (2016) واجريت لهم موجات صوتيه عن طريق البطن باجهزهمختلفه. هدفت هذه الدراسه تقييم تضخم البروستاتا الحميدباستخدام الموجات فوقالصوتيه

أظهرت هذه الدراسه أنئ(53)مريض تتراوح أعمارهم بين(52-85) (سنه) وأكثر فئه عمريه متأثره هى (70-61) (سنه).(22) بنسبة(41,5)%

وأن متوسط أنتجينالبروستا(,9,7)بين(4)ن ملجم الى(26)ن ملجم.وايضا اظهرتالدراسهبا الموجات فوق الصوتيه ان متوسط حجم البروستاتا(83 جم),و منتظم الحواف(33)(62,3%) والاستسغاءالكلوى والتكلس اقاشوعا عند مرضى تضخم البروستاتا الحميد(5)(9,4)%(11)(20)% على التوالى. توجد علاقه قويه بين عمر المرض وحجم البروستاتا وايضا توجد علاقه قويه بينأنتجين البروستاتا وحجمها.

عموما وجدت الدراسه هذه إن إستخدام الموجات فوق الصوتيه عن طريق البطن فعاله في تقييم تضخم البروستاتاالحميد.واوصت هده الدراسه بعمل دراسات اخرى باستخدام الموجات الصوتيه عن طريق المستقيم.

List of abbreviations

AAH	Atypical Adenomatus Hyperplasia
BPH	Benign Prostatic Hyperplasia
Cz	Central zone of prostate
HIFU	High Intensity Focused Ultrasound
PIN	Prostatic IntraepithelialNeoplasia
PSA	Prostatic-Specific Antigen
Pz	Peripheral zone of prostate
TAS	Trans abdominal ultra sound
TRUS	Trans rectal ultrasound
Tz	Transient zone of prostate
US	Ultra sound

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CHAPTER ONE

1.1 Introduction:

The prostate gland is achestnut-sized organ located in the pelvic, posterior to the symphsis pubic and pubic arch, anterior to rectum and just beneath the urinary bladder. It is encircles the proximal part of the male urethra and it have three zone (transition, central, peripheral zone) the central zone characterized by glandular tissue so the prostate secretion account most of the volume ofsemen. **(**Deamet,all .2002)

Benign prostatic hyperplasia (BPH) is an enlarged prostate gland. An enlarged prostate is is also known as benign prostatic hypertrophy.

BPH involves hyperplasia of prostatic stromal and epithelial cells, resulting in the formation of large, fairly discrete nodules in the transition zone of the prostate.(Cunningham et.al 2013)

Benign prostatic hyperplasia is probably a normal part of the aging process in men, caused by changes in hormone balance and in cell growth.BPH causes urinary problems such as, trouble getting a urine stream started and completely stopped (dribbling), often feeling like you need to urinate, this feeling may even wake you up at night,a weak urine stream and a sense that your bladder is not completely empty after you urinate.(Indian J2011)

Ultrasound is non-invasive, in expensive and repeatable modility and has been used as important and valuable diagnostic tool for detecting prostatic diseases.

An ultrasound evaluation of the BPH has been performed by assessing various ultrasound factors such as the prostate size, echogenicity, capsule irregularity and .hydronephrosis

Finally I will try to evaluate low frequency medical diagnostic ultrasound on detecting BPH and to correlate the ultrasound findings with result of the other diagnosic tool.

1.2 Problem of the study:

Benign prostatic hyperplasia is common in elderly men; low frequency medical ultrasound can help on detecting prostate enlargement.

1.3 Objectives:

1.3.1 General objectives:

To evaluate benign prostatic hyperplasia by medical ultrasound.

1.3.2 Specific objectives:

1. To evaluate prostate volume and capsule
2. To co-relate the prostate size with PSA.
3. To reveal the relation between prostate gland enlargement and age using an ultrasonographic tool.

1.4 Overview of the study:

This study consisted of five chapters with chapter one is an introduction which includes problem and objective of the study, chapter two was a literature reviow which includes.(Anatomy, physiology,pathology and previous study),chapter three about research methodology, chapter four deal with result and chapter five discussion, conclusion and recommendations.

CHAPTER TWO

Literature Review and background studies

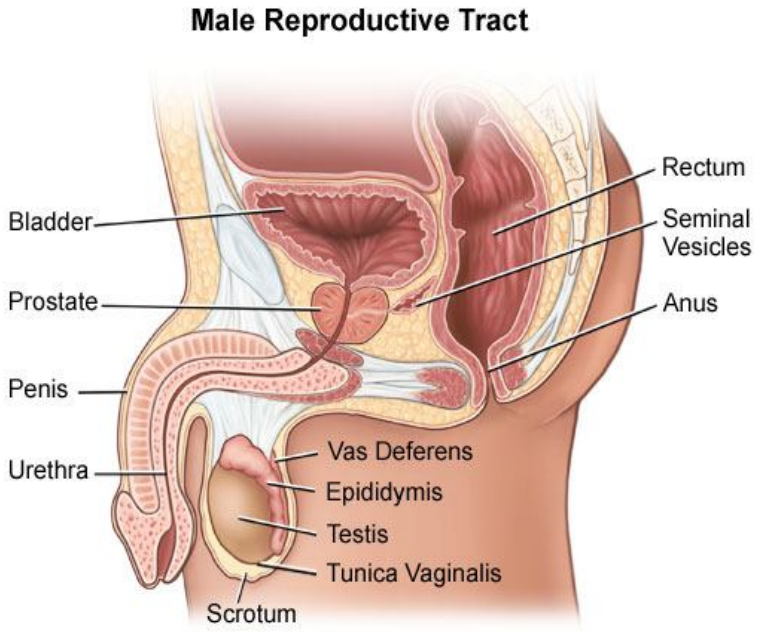
2.1 Anatomy

The prostate is fibromuscular glandular organ that surrounds the prostate urethra. It is about the size of achestunt and conical in shape. It isapproximately 3.5cm long, 4cm wide, 2.5cm anterior to posterior and lies between the neck of the bladder above and urogenital diaphragm.

The prostate is surrounded by fibrous capsule, outside the capsule is a fibrous sheath, which is a part of vescral layer of pelvic fascia. The some what conical prostate has abase, which superiorly lies against the bladder neck, and apex, which lies inferiorly against the urogenital diaphragm. The two ejaculatory ducts pierce the upper part of the posterior surface of the prostate to open into prostate urethra at the lateral margins of the prostatic utricle. The prostate have different relation with adjacent organs (fig2.1).(a.b)Superiorly, the base of the prostate is continuous with neck of the bladder. The smooth muscle passing without interruption from one organ to other. The urethra enter the center of the base of prostate.

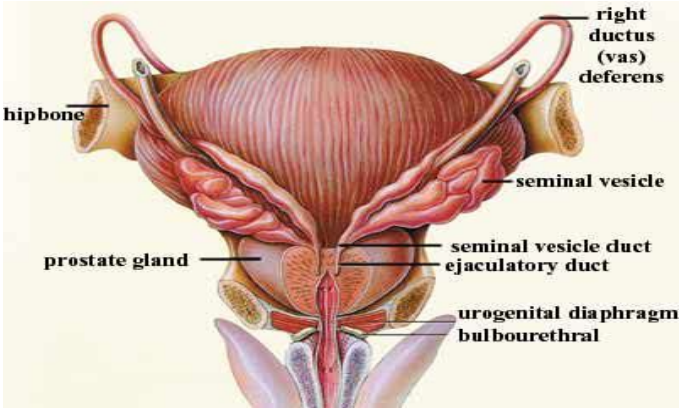
Inferiorly, the apex of the prostate lies on the upper surface of the urogenital diaphragm. The urethra leaves the prostate just above the apex on the anterior surface. Anteriorly, the anterior surface of the prostate is related to the symphysis pubis, separated from it by the extra peritoneal fat in the retropubic space. The fibrous sheath of prostate is connected to posterior aspect of pubic bones by the pubo-prostatic ligament. Posteriorly, the posterior surface of the prostate is closely related to anterior surface of the rectal ampulla and is separated from it by the rectovesical septum. Laterally, the lateral surface of the prostate are embraced by the anterior fibers of the levatorani as they run posteriorly from the pubis. The numorous gland of the prostate are embedded in

mixture of smooth muscle and connective tissue and their ducts open into prostatic urethra. (Richard S. Snell 1992)



(a)**(Webbmed llc2008)**

(b)



Fig(2.1 a,b):Shows the anatomical position of prostate gland and relation with adjacent organ**(**Webbmed llc2008)

.

The prostate can be divided in two ways, by zone, or by lobe.

Lobes: the lobes classification more use in anatomy.

The prostate is in completely divided into five lobes.

The anterior lobe ,lies in front of the urethra and is devoid of the glandular tissue.

The median, or middle lobe, is the wedge of the gland situated between the urethra and the ejaculatory ducts. It is upper surface is related to the trig one of the bladder.

The posterior lobe, is situated behind the urethra and below the ejaculatory ducts and also contains glandular tissue. The right and left lateral lobes, lie on either side of the urethra and are separated from another by a shallow vertical groove on the posterior of the prostate. The lateral lobes contain many glands.

Zones:

The zone classification is more often used in pathology. The prostate gland has four distinct glandular regions, two of which arise from different segments of prostatic urethra. (Meyers.Robert.2010)

Peripheral Zone (PZ):

Represent 70 to 75 of the volume of normal prostate. The peripheral zone warps around the organ posterior laterally. Its gland give rise to 70% of prostate adenocarcinomas and not subject to change of BPH.

Central Zone (CZ):

Represent 15 to 20% of the volume of the normal prostate. This zone surround the ejaculatory ducts. It give rise to 10% of adenocarcinomas.

Transition Zone (TZ):

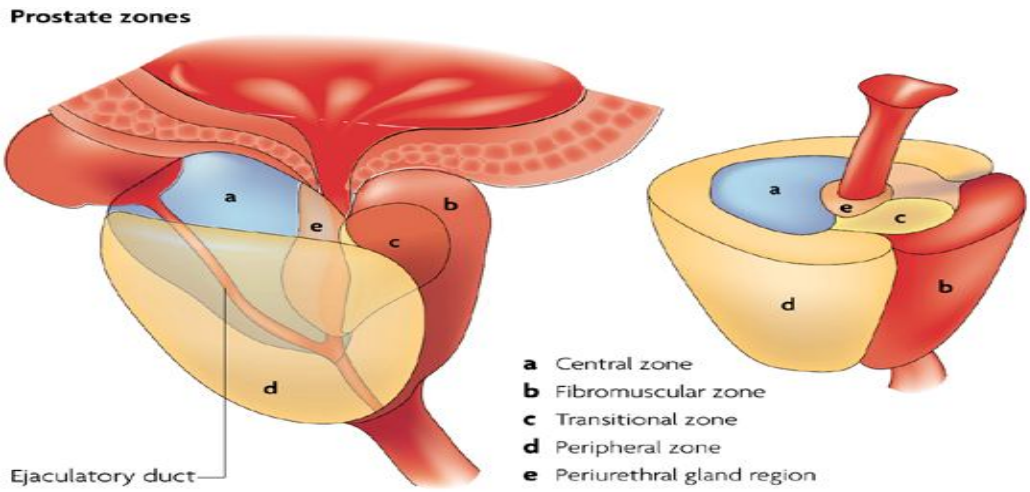
Represents 5 to 10% of volume of the normal prostate. This zone surrounds the proximal urethra. However, it is the site of development of benign prostatic hyperplasia (BPH)

Anterior fibromuscular zone (stroma)

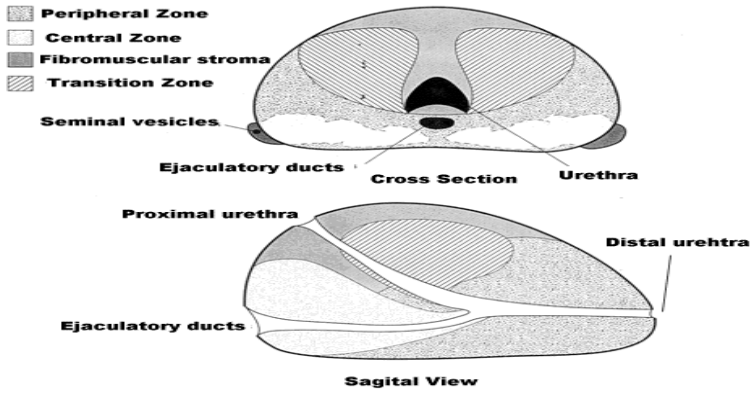
Encircles the anterio lateral portion of the prostate urethra, extending from the base to the apex of the prostate. .

Table (2.1) Shows relation between prostate lobes and zones. (Meyers.Robert.2010)

Anterior lobe or isthmus	Roughly corresponds to part of TZ
Posterior lobe	Roughly corresponds to peripheral zone.
Lateral lobe	Spans all zones
Midian lobe or middle lobe	Roughly corresponds to part of central zone



(a)



b)

Fig(2.2 a,b):Shows zonal anatomy of the prostate.**(Nature Review/cancer.2009)**

Blood supply:

Arteries:

Branches of the inferior vesical and middle rectal artries supply the prostate.(fig(2.3)

Veins:

The veins from the prostatic venous plexus, which is between the capsule of the prostate and fibrous sheath.

The prostatic plexus receives the deep dorasal vein of penis and numerous vesical veins and drains into the internal iliac veins.

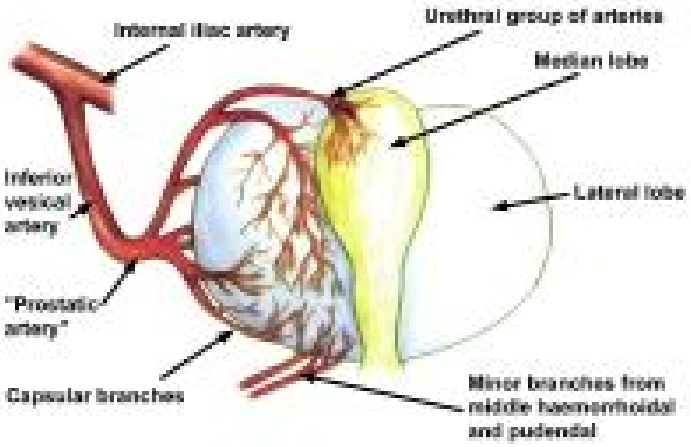
Lymph drainge:

The lymph vessels from the prostate drain into the internal iliac nodes.

Nerve supply:

The nerve supply to prostate is from the inferior hypogastricpelxuses.

The sympathetic nerves simulate the smooth muscle of the prostate during ejaculation. (Richard S. Snell .1992)



Fig(2.3):Shows blood supply of the prostate..(DrKupe 2011)

2.2 Embryology:

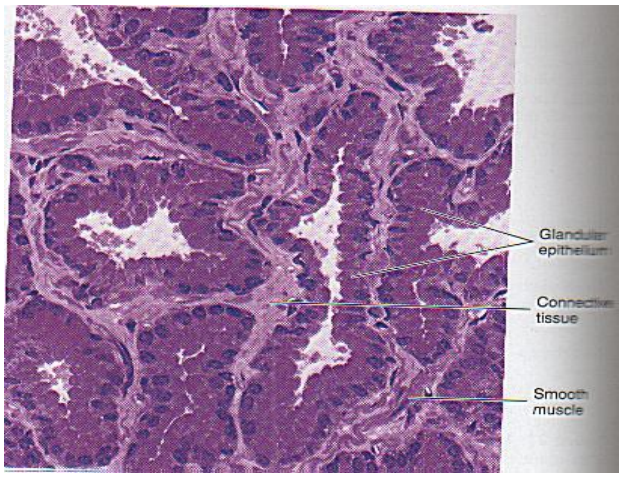
By the 6^{th} week of gestation the urorectal septum has divided the cloaca into anterior urogenital sinus (UGS) and the posterior anorectal canal. The distal mesonephric ducts become incorporated into urogenital sinus at this time and will give rise to the male sex accessory glands (except prostate) under control of testrone. In contrast prostatic embryogenesis begin during the 12^{th} week of gestation and is dependent on dehydratestosterone. This process involves paired epithelial buds that arise from the UGS and penetrate the surrounding mesenchyme.

This interaction between the epithelium (glands) and mesenchyme (stroma) may be important in the pathogensis of BPH(.MarkHill.2011)

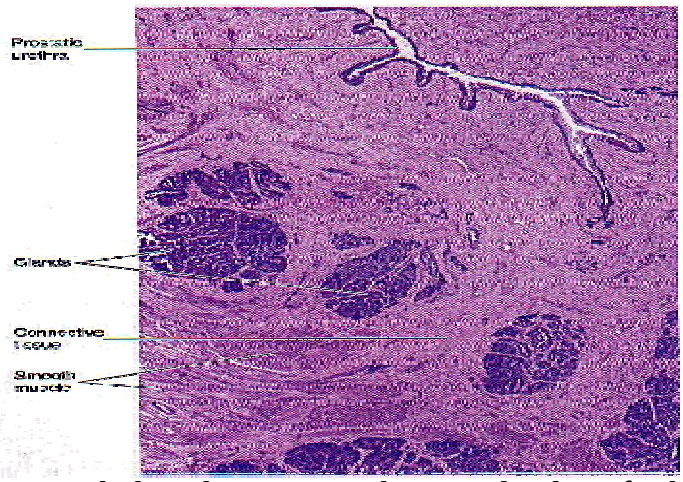
2.3 Histology:

The prostate gland, composed of 30-50 small tubulo-alveolar glands, surrounds the beginning of the urethra and opens into its floor by about twenty ducts; it is pierced by the ejaculatory ducts. The glandular tissues consist of branching tubules with dilated endings that appear in a section as large alveoli with folded walls; they are lined by a non ciliated columnar or cubical secretory epithelium supported by small basal cells. The secretory cells contain droplets in the cytoplasm between the nucleus and the alveolar lumen, and these are discharged during the secretory cycle. The cells are also rich in acid phosphates .they are very sensitive to the concentration of androgens, becoming very much reduced in size and activity after castration- an affect which can be reversed by the injection of male sex hormone. The alveoli often contain colloidal masses of secretion termed corpora amylacea. There is no definite basal lamina, but a layer of very vascular and elastic connective tissue surrounds the gland to form a capsule which sends broad radiating trabeculae into its substance. The interalveolar tissue consists of dense connective tissue, with collagen and elastic networks, and of numerous strands of smooth

muscle. a round the urethra the muscle forms a thick ring (fig2.4)(a, and b).Between the ejaculatory ducts is prostatic utricle, a fetal reminant of parameso-nephric duct, consisting of a blind sac that opens in the prostatic urethra lined by ciliated epithelium that dips down to forms short glands..(Luis Carlos et.al)



Fig(2.4 a): histopatholgical section of the central region of the prostate showing the prostatic urethra and tubuloalveolar glands surrounded by connective tissue and smooth muscle.



Fig(2.4 b) histopatholgical section shows glands of the prostate surrounded by connective tissue and smooth muscle

2.4 Physiology:

The scientists do not all the prostate‘s functions. The prostate gland secrets a thin, milky fluid that contains calcium, citrate ions, phosphate ion, a clotting enzyme, and a profibrinolysin .During emission, the capsule of the prostate gland contracts simultaneously with the contractions of the vas deferens so that the thin, milky fluid of the prostate gland adds further to the bulk of the semen. A slightly alkaline characteristic of the prostatic fluid may be quite important for successful fertilization of the ovum, because the fluid of the vas deferens is relatively acidic owing to the presence of the citric acid and metabolic end products of the sperm and, consequently, helps to inhibit sperm fertility. Also, the vaginal secretions of the female are acidic (pH of 3.5 to 4.0).Sperm does not become optimally motile until the pH of the surrounding fluids rises to about 6.0 to 6.5. Consequently it is probable that the slightly alkaline prostatic fluid helps to neutralize the acidity of the other seminal fluids during ejaculation, and thus enhances the motility and fertility of the sperm. The prostate secretion is a thin opalescent liquid; it is rich in amylase and proteases, in particular in fibrinolysin. It is from the prostate that the semen receives its high concentration of citric acid and of acid phosphatase. Recently the prostate and seminal vesicles have been shown to be a rich source of substance known as prostaglandins: these are unsaturated hydroxy acid which,amongst other functions, stimulate the smooth muscle of the female genital tract to contract (Arthur Cet,all 2000)

Just now generally believed that the normal glandular activity of the prostate is controlled by the androgens and estrogens circulating in the blood stream. The secretions of the prostate are poured into the urethra during ejaculation and are added to the seminal fluid. Acid phosphatase is

an important enzyme present in the secretion in large amounts. When the glandular cells producing this enzyme can not discharge their secretions into the ducts, as in the carcinoma of the prostate, the serum acid phosphatase level of the blood rises.

It has been shown that trace amounts of proteins produced specifically by prostatic epithelial cells are found in peripheral blood. In certain prostatic disease, notably cancer of the prostate, this protein appears in the blood in increased amounts. The specific protein level can be measured by a simple laboratory test called the PSA (prostatic specific antigen) test.the differences between the urinary tracts of men and women result in different incidence of pathologies. Women have much shorter urethras than men and are therefore much more susceptible to bacterial invasion of the bladder. In men, the urethra penetrates the prostate gland, which in about have of men over 60 undergoes benign hyperplasia. This enlargement only presents a problem when the prostate compresses the urethra to such a degree that the bladder cannot empty properly. In the early stages, the detrusor muscle hypertrophies, so helping to force urine out against the increased resistance. As the condition progress, the discomfort of a constantly over bladder and the damage to bladder and kidneys that retention can cause require treatment of the condition. This can be by drugs that shrink the prostate by interrupting the action of hormones that stimulate it or by surgical removal of the gland .. (Richard S. Snell .1992)

2.5 Pathology:

Only three pathologic processes affect the prostate gland with sufficient frequency to merit discussion inflammation, benign nodular enlargement, and tumors. Of these three, the benign nodular enlargement is by far the most common and occurs so often in advanced age that they can almost be construed as a (normal) aging process. Prostatic carcinoma is also an extremely common lesion in men and therefore merits careful consideration. The inflammatory processes are, for the most part of less clinical significance and can be treated briefly (Rnm. et al.1992)

2.5.1Prostatitis:

Is inflammation of prostate gland..Acute prostatitis, is not common, but is most likely to occur in young men. The majority of cases of acute prostatits are due to ascending infections caused by Ecoli, catheterization, cystoscopies and urethral dialations also frequently result in acute prostatis. A related complication of prostatic abscessis uncommon. . (Potts.2001)

Chronic prostatitis, may follow the acute form but in the majority of cases no causative organism is identified and no previous acute state has been noted.

Clinically, both acute and chronic forms are associated low back pain, disyuria, frequency and urgency. Sometimes the prostate is enlarged and tender. Fever may be noted with acute form. Frequently chronic prostatitis is a symptomatic and result in repeated urinary tract infections by constant seeding of bacteria. Prostatitis can elevate the serum prostatic specific antigen (PSA), but generally not more than double normal, and generally not increasing significantly over time.

Sonographic finding of Acute prostatitis appear asmoderately enlarged gland with focal hypoechoic or hyperechoic area, with poor margination in the peripheral prostate. The prostate may also appear normal.Color and power Doppler imaging demonstrates marked hyper vascularity.Prostatic abscess appears as mixed lesion within the parenchyma. It is a vascular on color Doppler, but may have increased flow at the margins.

Chronic prostatitis, appear as focal masses of different degrees of echogencity, ejaculatory calcifications, thickening or irregularity of the capsule, periurethral irregularities, dilation of periprostatic veins and destended seminal vesicles. . (Hanley&Belfus.2004)

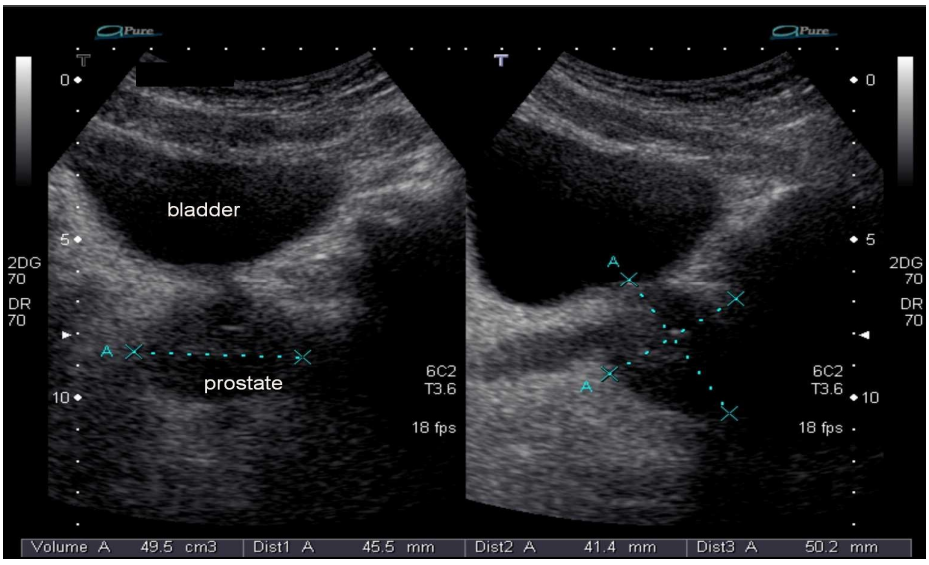


Fig (2.5)Shows songraphic appearance of prostatitis..(Viable ultra sonnd CD.ROM)

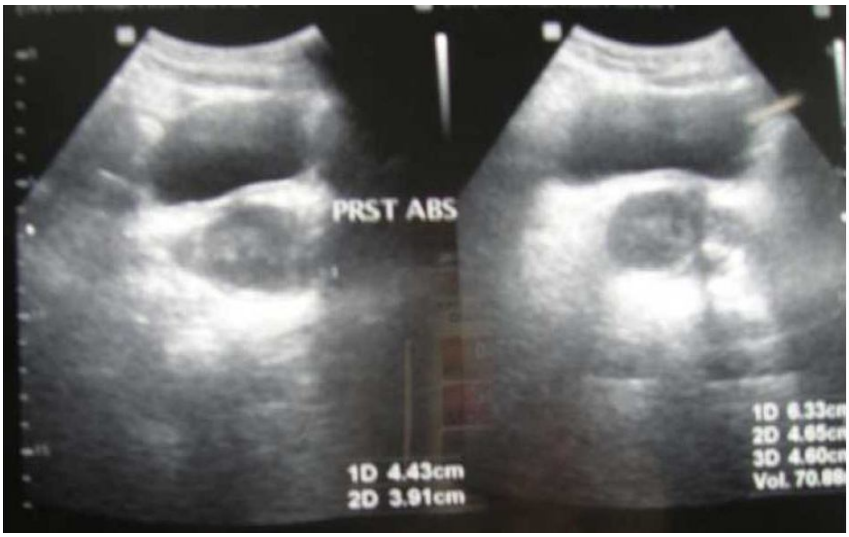


Fig (2.6)Showssonographic appearance of prostate abscesses**..**(Viable ultra sonnd CD.ROM)

2.5.2 Prostatic cyst:

1- Congenital.Mullerian duct cysts.

Are derived from the embryologic mullerian ducts and most commonly are located to mid line at the level of the veruentum.

2- Utricle cysts:

Are derived from another embryological structure called utricle. This is small blind sac extending from posterior urethra at the level where the ejaculatory ducts enter the prostatic urethra.

Utricle cysts are located in the mid live near the vermontanum. Utricle cysts are associated with other genitourinary abnormalities such as unilateral renal agenesis and cryptorchidism.

Sonogrphic finding**:**

Most utricle cyst are tube shaped and < 1cm length. They may fill with urine and empty with voiding.

Mullerian duct cyst are often large and extend beyond the prostate and present as cystic pelvic masses.

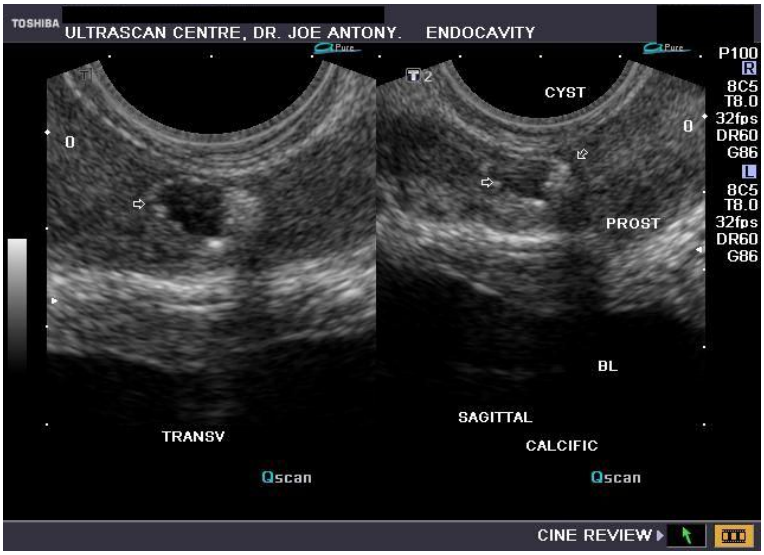
Acquired cysts: These are more common than congenital cysts.

Ejaculatory duct cysts, are usually due to obstruction by hyper plastic nodules or as a result of surgery. They may cause infertility, ejaculatory pain or hematospermia. Ejaculatory duct cysts are located along the course of the ejaculatory duct.

Cystic degeneration of BDH nodules ,due to necrosis and infarction with hyper plastic gland result in cystic looking areas within the innergland. These cyst are very common and are usually small (< 1cm) and within nodule.

They can contain calculi or echogenic fluid cause by hemorrhage or necrosis.

Retention cysts ,are caused by obstruction of prostatic ductules resulting in cystic dialation of glandular acini. The cyst do not contain sperm and are a symptomatic on ultrasound, retention cyst are anechoic, smooth walled, unilocular, 1.2cm in diameter and located away from mid line (Deam.et.al.2002)



(a)

(b)

Fig (2.7a,b):Shows prostate cyst(a) withTRUS(b)withTAS..(Viable ultra sonnd CD.ROM)

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2.5.3 Prostatic hyperplasia:

Nodular prostatic hyperplasia (also termed benign prostatic hyperplasia or BPH) is a common condition as ménage, perhaps a fourth of men have some degree of hyperplasia by the fifth decade of life. By the eighth decade, over 90% of males will have prostatic hyperplasia. However, in only a minority of cases (about 10%) will this hyperplasia be symptomatic and sever enugh to require surgical or medical therapy.

The mechanism for hyperplasia may be related to accumulation of dihydrotestosterone in the prostate, which then binds to nuclear hormone receptors which then trigger growth. The normal prostate weigh's 20 to 30 gm, but most prostates with nodular hyperplasia can weigh from 50 to 100 gm. Hyperplasia begins in the region of the veru-monterum, in the innerzone of prostate and extends to involve lateral lobes. This enlargement impinges upon the prostatic urethra, leading to difficulty on urination with hesitancy that is typical for this condition. Dysuria, dirbbling and nocturia are also frequent. The urinary tract obstruction lead to urinary retention and risk for infection. In sever, prolonged eases, hydroureter with hydrorephrosis and renal failure can ensure.. (Affenberg.et.al.2009)

Microscopically, nodular prostatic hyperplasia consists of nodules of glands and intervening stroma. Most of the hyperplasia contributed by glandular proliferation, but the stroma is also increased, and in rare cases may predominate. They gland may be more variably sized, with larger glands have more prominent papillary in folding nodular hyperplasia is not a precursor to carcinoma.

A typical adenomatous hyperplasia**:**

A typical adenomatous hyperplasia (AAH) is a term that has been utilized to describe changes histologically seen in prostatic gland in the apex, periurethral region and/or transition zone of prostate. AAH is a localized proliferation of small acini within the prostate. Such proliferation may be confused with carcinoma, but the glands with AAH still have a fragmented basal layer. AAH can be difficult to distinguish from hyperplasia. There is no clear association between the presence of AAH and the development of prostatic adenocarcinoma.

Prostatic intra epithelial neoplasia:

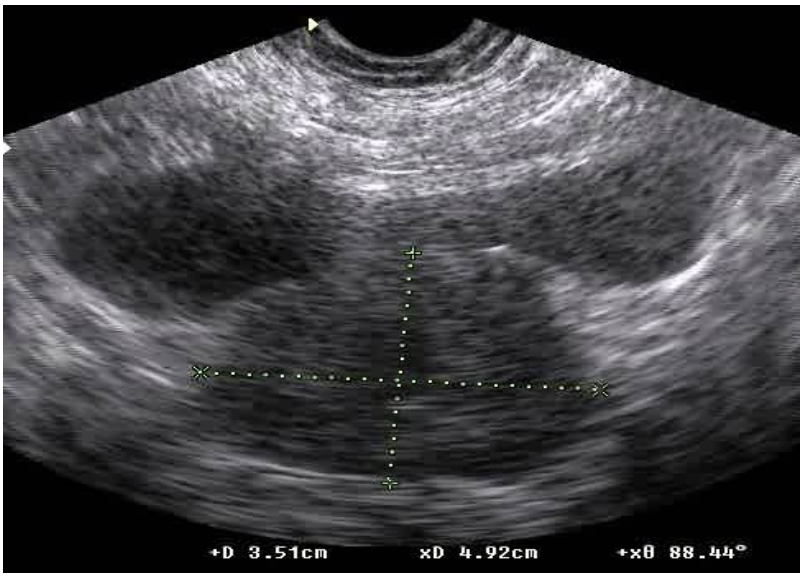
Prostatic intra epithelial (PiN), which is dysplasia of the epithelium lining the prostate glands, is a probable precursor of prostatic carcinoma. The appearance of PiN may precede car cinoma by 10 or more years. It can be divided into low grade and high grade PIN. Low grade PIN may be found even in men in middle age. PIN does not routinely increase the serum prostate specific antigen (PSA). PIN usually involves an acinus or a small duster of acini, but it can be more extensive on occasion. The acini are usually medium-sized to large, with rounded borders. The partial involvement of an acinus is helpful feature to distinguish PIN from adenocareinoma. PIN is characterized histologically by progressive basal cell layer disruption, loss markers of secretory abnormalities, increasing proliferative potential, increasing microvessel density variation in DNA content and allvulie loss. Unlike adenocarcinoma, with which is may coexist, glands with PIN retain an intact or fragmented basal cell layer.

The appearance of PIN warrants increased surveillance of prostate for development of an invasive carcinoma because the presense of PIN that is high grade suggests an increased risk for subsequent appearance of adenocarcinoma. PIN itself is not an indication for aggressive treatment.(Montironi.et.al.2007

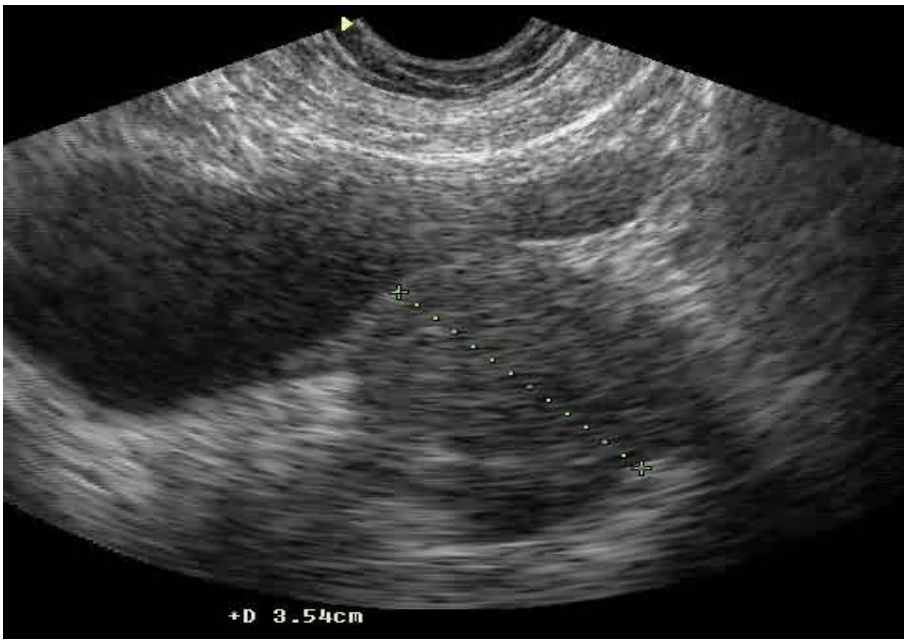
Sonographic finding:

BPH is demonstrated as an enlarged prostate (> 40g); the inner gland is hypoechoic and inhomogeneous compared to the PZ; multiple hyperechoic nodules are often present in the inner gland; nodules frequently under go cystic degeneration and calculi from along the surgical capsule.

A post transurethral resection prostate appears thin with a preserved PZ and scant or abscent inner gland. The urethra is widened into a funnel shape with the widest portion at the bladder base. Deam.et.al.2002)



Fig(2.8) Shows sonographic appearance of BPH.Transverse scan(TAS) .



Fig(2.9) Shows sonographic appearance of BPH.Longitudinal scan(TAS). .

2.5.4 Prostatic adenocarcinoma

Adenocarcinoma of the prostate is common. It is the most common non-skin malignancy in elderly men. It rare before the age of 50, but autopsy studies have found prostatic adenocarcinoma in 80% of men more than 80 years old.

Many of these carcinomas are small and clinically in significant. However, some are not, and prostatic adenocarcinoma is second only to lung carcinoma as a cause for tumor-related death among males.

Men with a higher likelihood of developing a prostate cancer (in the U.S) include those of older age, black race, and family history. Those with an affected first degree relative have a much greater risk prostate cancer may be detected by digital rectal examination, by ultrasonography (trans rectal ultrasound), or by screening with a blood test for prostate specific antigen (PSA). Non of these methods can reliably detect all prostate cancers, particularly the small cancers.

The only test that can fully confirm the diagnosis of prostate cancer is a biopsy of the prostate and examine it under a microscope further tests, such as CT scans and bone scan may be performed to determine whether prostate cancer spread.(Wollf,s.H.2005

Prostatic adenocarcinoma are composed of small glands that are back-to back, with little or no intervening stroma-cytologic features of adenocarcinoma include enlarged round, hyperchroromatic nuclei that have a single prominent nucleous. Mitotic figures suggest carcinoma. Less differentiated carcinomas have fused glands called cribriform glands, as well as solid nests or sheets of tumor cells, and many tumors have two or more of these patterns. Prostatic adenocarcinomas almost always arise in the posterior outer zone of prostate and are often multifocal, prostatic adenocarcinomas are usually graded according to the Gleason grading system based on the pattern of growth. There are 5 grades (from 1 to 5) based upon the architectural patterns. Adenocarcinoma of prostate are given two grades based on the most common and second most common architectural patterns. These two grades are added to get a final grade of 2 to 10. The stages is determined by the size and location of the cancer wether it has invaded the prostatic capsule or seminal vesicle, and whether it has metastasized.

The grade and the stage correlate well with each other and with the prognosis.

The prognosis of prostatic adenocarcinoma varies widely with tumor stage and grade. Cancer with a Gleason score of < 6 are generally low grade and no aggressive. Advanced prostatic adenocarcinoma typically cause urinary obstruction, metastasize to regional (pelvic) lymph nodes and to the bones causing blastic metastases in most cases. Metastases to the lungs and liver are seen in a minority of cases. (Epstein.et.al.2005)

Treatment options of prostate cancer with intent to cure are primarily surgery, radiation therapy, stereotactic radiosurgery, and proton therapy. Other treatments, such as hormonal therapy, chemotherapy, cry surgery and high intensity focused ultrasound (HIFU) also exist. . (Fitzpatric, JM 2008)

Ultra sound finding**:**

In ultrasound the prostate cancer may appear a symmetrically enlarged. Tumor shape variable, variable echopattern: may be hyperechoic, hypoechoic, or isoechoic to normal prostate parenchyma. It may see calcifications with irregular distribution in the prostate, often accompanied by diffuse increased echo around them due to inflammation. Color Doppler imaging may identify area of hyper vascularity. (Sundrl.2001)

70% of cancer sare seen as hypoechoic lesion in the peripheral zone. Unfortunately these sonographicappearces are also similar to prostatitis fibrosis and infarction.

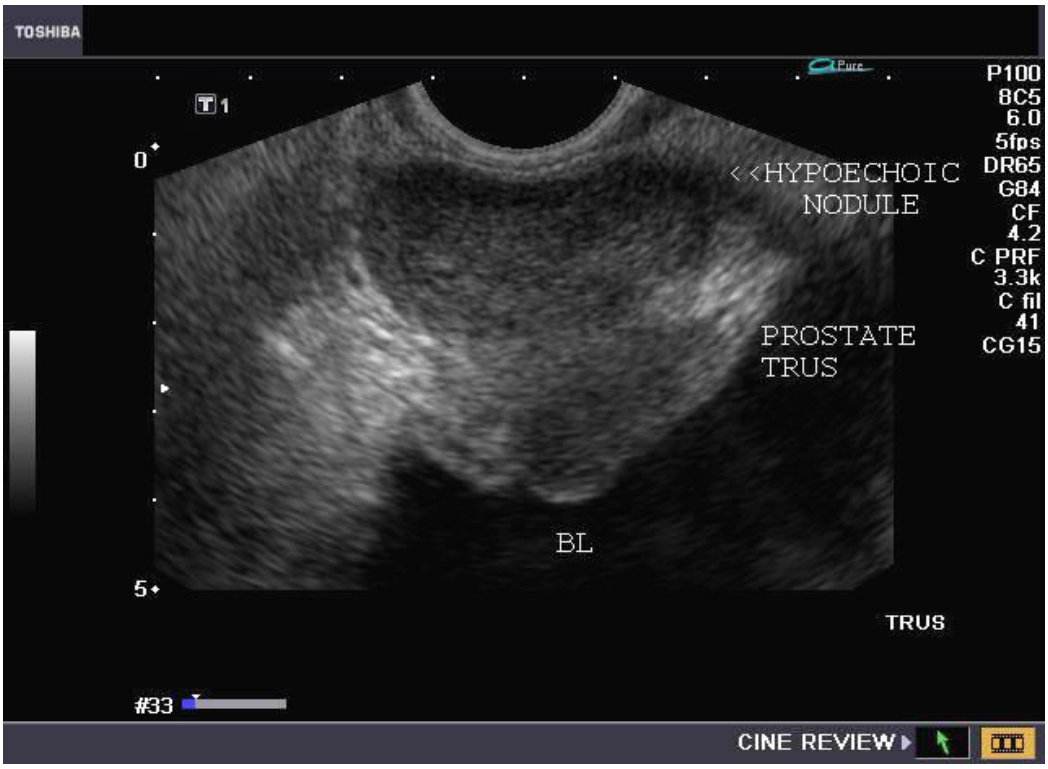


Fig (2.10) Shows sonographic appearance of adenocarcenoma of prostate..(Viable ultra sonnd CD.ROM)

2.6 Prostate laboratory tests

2.6.1 Serum acid phosphatase test:

This test is used to identify metastases of the prostate gland.

The normal gland and carcinoma of prostate are both rich in acid phosphatase however, only small amounts of this enzyme are found in serum if the gland is normal or if the carcinoma has not metastasized. Therefore, in proper clinical setting, an elevated serum acid phosphatase level indicates metastases from prostate gland. If the tumor has metastasized to the bone there will also be ahighalklinephosphtase level inaddition to the elevated serum acid phosphatase .If the tumor has metastasized to the liver, the secondaries may cause biliary obstruction resulting in Jundice and elevation of both serum alkaline and serum acid phosphatase level. Note (unless given some indication of metastases to the liver or bone, consider that an elevated serum acid phosphatase level indicates metastases of prostate gland (which is not associated with jundice).

2.6.2 Prostate specific antigen (PSA):

The PSA is aglycoprotein produced exclusively by the prostate gland; when elevated the possibility of prostate cancer exists. The higher the elevation, the more likely a cancer exists and that has spread. About 97% of men with normal prostate glands without hyperplasia have PSA levels under 4 ng/ml. (PSA can be elevated by virtually any abnormality affecting the prostate, whether benign or malignant including BPH, atrophy, inflammation, infarction and manipulation).

PSA levels

0 – 4 ng/ml = normal

4 – 10 ng/ml = borderlines

> 10 ng/ml = abnormal (biopsies recommended) (Deam.et.al.2002

2.7 Sonographic scanning of the prostate:

Ultra sound imaging of prostate a well-established and widely used technique to assess the prostate as well as the bladder, smenal vesicles and urethra. Recent advances in probe technology allow examinations of these area to be carried out using different approaches; trans abdominal (suprapubic), trans rectal (TRUS), and transperineal.

During conventional trans abdominal scanning of the full bladder, the bladder neck, prostate and seminal vesicles can be visualized and a large prostate indenting the bladder base can evaluate and it is volume measured. Large abscess or cystic lesions deep to the bladder base can also be visualized to some extent; however, the detailed zonal anatomy of the prostate and surrounding structures and any smaller focal lesions will not be easily seen.

The patient must come with full urinary bladder; 500–800 ml of clear fluid should be ingested one hour before the exam and finished within a 15 to 20 minutes time period. If for any reason the patient cannot have fluids, sterile water can be used to fill the bladder through afolays catheter. The fully urinary bladder displaces the bowel and brings the pelvic organs into view.

And an over filled bladder can actually push the pelvic contents out of view if so, have the patient partially void. Patient lies on supine position, with a normal respiration. When the bladder distended, its walls will be smooth and evenly stretched with or without diverticula, measurements confirm over distention; looking for ureters, kidneys and rescanning after completely empting the bladder the transducer used is convex type of 3.5 MHz frequency. Begin prostate scanning with the transducer perpendicular at the body. Just superior to the symphysis pubis and angle inferiorly. The prostate will visualize here. One the long axis of the prostate is located, angle the transducer inferiorly to scan the apex of the

prostate until you are beyond it. Return to midline just superior to the symphysis pubis, with the transducer angle inferiorly "less than the former", locate the long axis of prostate. It may be necessary to rotate the transducer varing degrees to visualize the long axis of the prostate. One the long axis of prostate is located, slowly move the transducer toward the patient right, scanning laterally through the prostate until you are just beyond it. Continue to scan right lateral though the pelvic side wall until you are beyond it. Return to the midline just superior to symphysis pubis "transducer angle inferiorly", and locate the long axis of prostate. Once the long the long axis located, slowely move the transducer toward the patient left, scanning latterly through the prostate until you are just beyond it. Continue to scan left lateral through the pelvic side wall until you are beyond it. Still in the sagittal plane, locate the long axis of the prostate. Rotate the transducer 90 degrees into the transverse scanning plane to traverse the prostate. Begin with the transducer angle inferiorly, at mid line of the body, just superior to the symphysis pubis. Angle the transducer inferiorly enough that you are out of the pelvic.

Scanning superiorly through the prostate until you are beyond the base of prostate. Slowly angle the transducer back into the pelvic, looking first for the apex of prostate. (Betty &Temkin.1993)

Prostate volume measurement is based on mathematical formula known as Ellipsoid method, where the prostate is imaged in both trans verse and sagittal mid line plane. The images are stored or viewed simultaneously on a split screen. The volume is calculated on using the prolate ellipsoid formula known as Ellipsoid method:

V=L.H.W.C

Where L represents the length of the prostate and H the height (both these measurements are best taken on the sagittal image): W represents

the width or transverse diameter; and C represents a constant approximately 0.523.

The same formula is used to measure the bladder volume and bladder post void residual volume.

There are many differential diagnosis pathologies of significant post micturition urine volume: urethral stricture or calculus in a neurogenic bladder from damage the spinal cord, and cytocele in some patients. (Sandra L 2001)

Fig(2.11) Shows(TAS)Longitudinal scan of prostate .

Fig (2.12) Shows(TAS)Transverse scan of prostate..(Viable ultra sound

The overall sonographic appearance of the normal prostate is symmetric as the probe is swept side to side. The majority of parenchyma of prostate gland appears as homogenous, mid gray, medium level echoes . The periurethral glandular stroma that surrounds the urethra is slightly hypo echoic in compare to surrounding tissue

The contour of gland should appear smooth and margins well denned. Calcification may be seen throughout the gland in older patients. The normal prostate should appear symmetrical. The seminal vesicles appears as symmetrical mid gray or medium to low-level echo texture, superior to the prostate. They are easier to visualize when the urinary bladder is partially filled. They are seen in long axis on transverse scans. The prostatic urethra walls appear echogenic at the mid line of the gland. The vas deferens and ejaculatory ducts may be difficult to distinguish from surrounding structures. However, when seen, the vas differentia are medial to the seminal vesicles. The ejaculatory ducts will appear as echogenic double lines.

Normally, the central and transition zones are not sonographically distinctive the peripheral zone appears homogenous and slightly hyperechoic to adjacent parenchyma .(Roderick et all 1992)

Trans rectal scanning

Patient Preperation:

- Self-administered enema prior to the exam.
- Explain**g** the examination to the patient.

Patient position:

- Left lateral decubitus with knees bent toward the chest.
- Lithotomy position.

Transducer :

- 5 to 10 MHz.
- Apply gel to the end of the tranducer, then cover it with a condom. Secure the condom with a rubber band and make sure there are no air bubbles at the tip. Apply additional lubrication to the outside of the condom before insertion.

Prostate Scanning:

Transverse Scanning:

Transverse Plane Rectal Approach :

To survey the prostate transversely, the transducer is inserted into the rectum and then withdrawn sequentially to examine the prostate superiorly (base) to inferiorly (apex).

1- With the transducer inserted, the survey begins at the level of the seminal vesicles.
2- After the seminal vesicles and vas deferens have been evaluated, slowly withdraw the transducer to scan through the prostate fromits superior to inferior margins. The lateral margins should be well defined.

Note the size, shape, and symmetry of the prostate.

Longitudinal Scanning:

Sagittal Plane Rectal Approach:

To survey the prostate longitudinally the transducer is rotated clockwise, and counterclockwise to examine the prostate from one lateral edge to the other.

1- Begin at the midline of the prostate. The superior and inferior margins should be well defined and the prostatic urethra visualized.
2- To examine the lateral aspects of the prostate, seminal vesicles, and vas deferens, rotate the transducer clockwise and counterclockwise. (Gilany.2002)

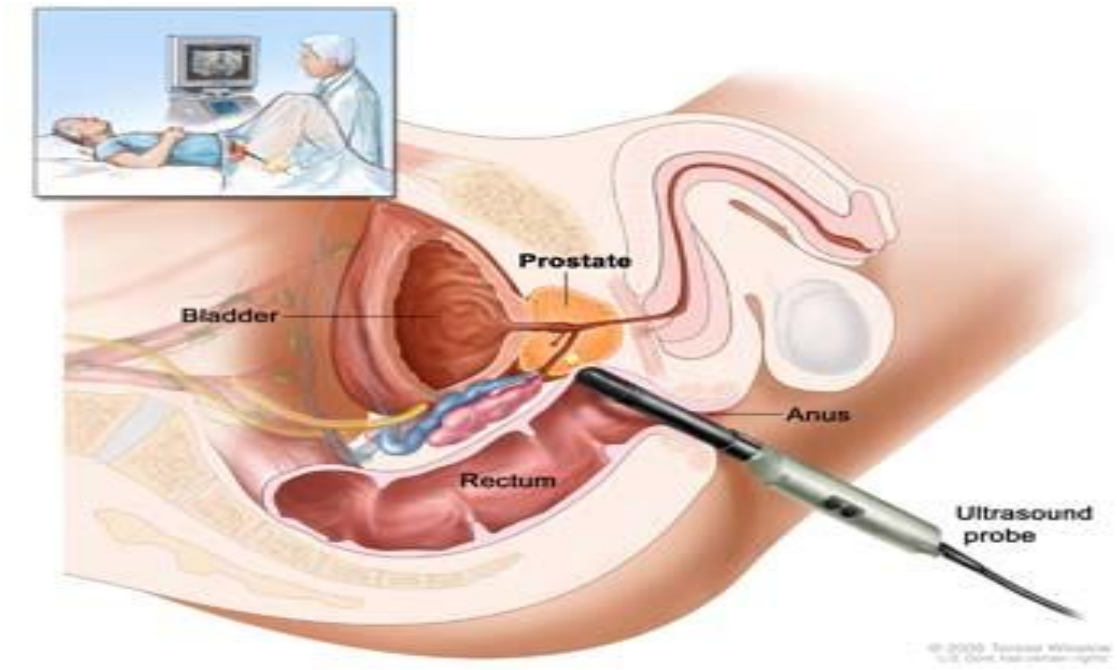


Figure (2.13) Shows transrectal ultrasound of prostate (Prostate cancer.2012)

2.7 Previous Study

Awad Ali M. Alawad, Faisal H. Younis, AbdallaMahgoubEltoum , Sana AzmiAbdelgani(2014)Serum prostate-specific antigen as a predictor of prostate volume in Sudanese patients with benign prostatic hyperplasia. Enrolled patients had a median age of 63.5 years (51 to 94), a mean PSA of 2.94 ng/ mL and a mean PV of 46.96 mL, respec-tively. There is linear relationship between PSA levels and prostate size. Those with a prostate size of > 40 ml were found to be more likely to have high PSA mean level. PSA mean values were found to be associated with age (P <0.006).Conclusion: Serum prostate specific antigen (PSA) is significantly correlated with prostate volume in Sudanese men. PSA may be a useful tool in making therapeutic decisions and follow-up management in BPH patients.

M. Elsamani, H. Osman, Moh.Yasen, Ali. Yasen , Ahm.Yasen(2016)Sonographic Finding of the prostate in Saudi PopulationThe results of study show that the enlargement of prostate is most common pathology which increases with age, and the other pathology is low incidence. The calcification changes are also low and due to aging or associated with pathology.The most prostatic pathology with enlargement of prostate is associated with abnormal micturition. The of result shown that there is 84% of the all patients present with abnormal micturition, and 97.14% among the patients with BPH present with abnormal micturition to only 2.86% present with normal micturition. Also there was 66.7% of BPH present with elevated PSA and 33, 3% present with normal PSA .There is a significant correlation between age incidence, and PSA level and the volume of the prostate at p = 0.05 with a correlation coefficient r = 0.5 and 0.44 respectively. This association dictates a direct relationship between the PSA level, volume of the prostate and the age. Correlation is

significant at the 0.01 level . In slightly disagreement with previous study done by Mutaz Ibrahim YasienAhmed, he was shown that the BPH peak in age group of (60-69 years) which is differ from this study results which shown that the BPH peak in age group of (70-80 years).The second pathology in this study is prostatic carcinoma with (3%) incidence. The study shown (2%) of patients have prostatitis, one age group of (40-49years) and anther in (50-59 years).The calcification changes is (13%) most of them in elderly age of group (70-80years) and other in group (60-69 years

Elfatih Mohammed AwadElkareemEltahir(2007) Ultrasonography Screening of Prostate Gland Enlargement in patients of Merowe provinceUltrasonographic scanning done to 75 patients in the study, the researcher found that the younger age group (60-69 years) had less percentage of prostate gland enlargement occurrence (51 %), the oldest age group (80-89 years) had most percentage of prostate gland enlargement (79 %), the intermediate age group (70-79 years) had an averaged percentage in compare to other two age groups (68 %). This indicates this match well with the prevalence of previous studies which showed that prostate gland size is increased with increasing age. The general percentage of prostate gland enlargement in patients with (60-89 years) old was 63% which is slightly less than the general internationally percentage (65%), in concerning with age groups, in first age group(60-69 years) was 51% , slightly higher than an internationally record 50%, whereas in the second group(70-79 years), I found that the percentage of BPH was 68%, which is lower than global percentage (80%), the final group (80-89 years) percentage was substantially less than world wide one (79% , 90% respectively) (10). Urine retention represents 49% in patients who had prostate gland enlargement (23 patients had a recent urine retention out of 47 patients had prostate gland enlargement). The

incidence of prostate gland inflammation represents 26% from patients with prostate gland enlargement (12 patients had prostatitis out of 47 patients with prostate gland enlargement). This study also revealed that incidence of cystitis, and residual urine in patients with BPH was high (40%, 83% respectively) in compare to worldwide percentages (32%, 69% respectively) (13). Out of 47 patients who were having prostatic enlargement there were only 7 patients had hydronephrosis, and this represents 15% of all BPH patients.

According to late three relations; upper urinary tract complication (H.N) are less frequently than lower tract pathologies (cystitis, and urine retention), so prostate gland enlargement have an ascending affections. This indicates that ultrasonography is not only helpful in measuring prostate size, it also informative to check the whole UT situations. The study was established to demonstrate the usefulness of ultrasonography in the screening of prostate gland enlargement; it is likely that ultrasonography is suitable for this purpose, and would not be confused with other clinical conditions.

CHAPTER THREE

3.1 Ultrasound machines.

Machine name ……Probes (transducers): (Curvi linear (3.5,5MHz) and convex (3.5,5MHz)

3.2 Study design:: A Cross Sectional Study involving(53)patients who presented with symptomatic BPH . The volume of the whole prostate was estimated using SPUS

3.3 Study area:

Sudan -khartoum(Om Dorman Teaching Hospital a ndOmDorman Clinics)

3.4 Study duration:

Is from June(2016) toOctoper(2016)

3.5 Study population:

Patients with symptomatic of Benign prosatichyperPlasia.

3.6 Inclusion criteria:

Patien a tattending to Om Dorman Teaching Hospital and Om Dorman Clinics with symptom or diagnose of Benign prostatic hyper Plasia

3.7 Exclusion criteria:

Patients with diagnosis of Benign prosatic hyperplasia and had prostatectomy

3.8 Sample size:53 cases

3.9 Method of data collection

By data collection sheet containing:(1)personal data (Age and clinical findings).(2) Labrotary finding(PSA)(3)Ultrasonic findings (prostate weight, prostate capsule, Echogensity, Site of lesion, Calcification and hydro nephrosis).

3.10 Data analysis:

The collected data will be arrange in master sheet and the computer and analyzed by excel and frequency tables and presented in form of graphes, tables, and figers.

3.11Data storage:

The data will store in my personal computer and flash.

3.12 Ethical consideration:

Will be taken while collecting the data.

CHAPTER FOUR

4.1 Result and analysis:

This study was carried out on 53 patients of enlarged prostate were examined with the following result according to the age, clinical, laboratory, and ultra sound findings.

Table (4.1) shows frequency distribution of age group in BPH patient's

Age group	Frequency	Percent	Valid Percent	Cumulative Percent
50 - 60 years	17	32.1	32.1	32.1
61-70 years	22	41.5	41.5	73.6
71- 80 years	11	20.8	20.8	94.3
more than 80 years	3	5.7	5.7	100.0
Total	53	100.0	100.0	
Minimum = 50.00 , maximum = 87.00, mean = 65.9057, std= 9.14260				

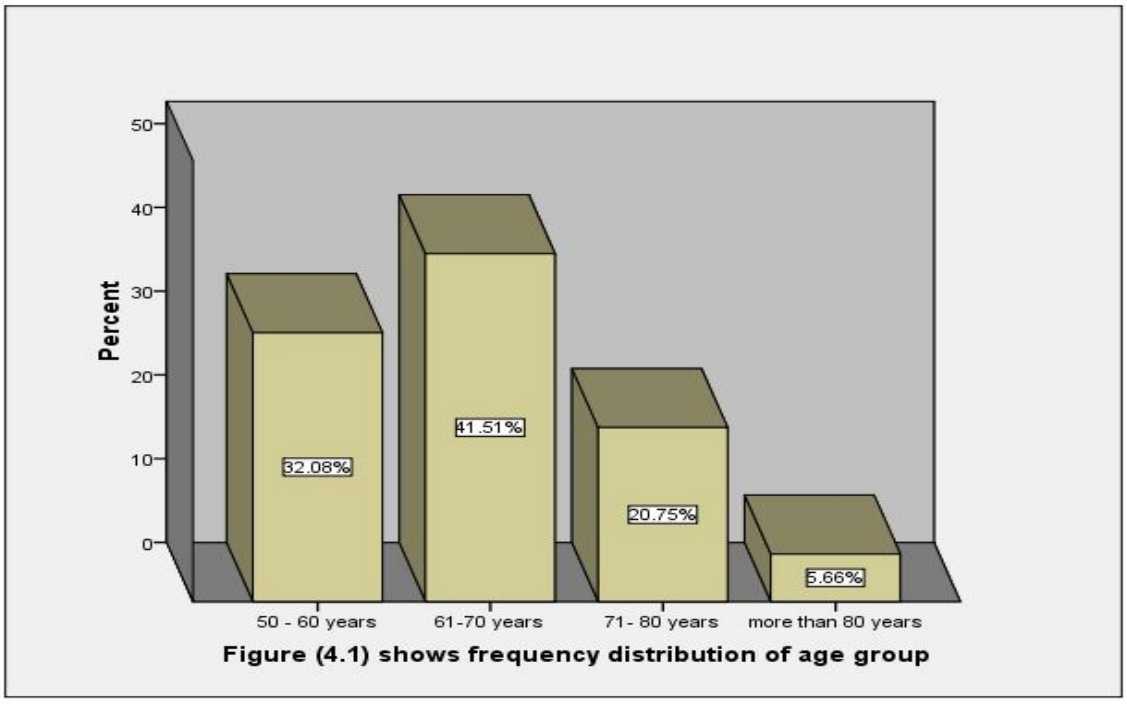
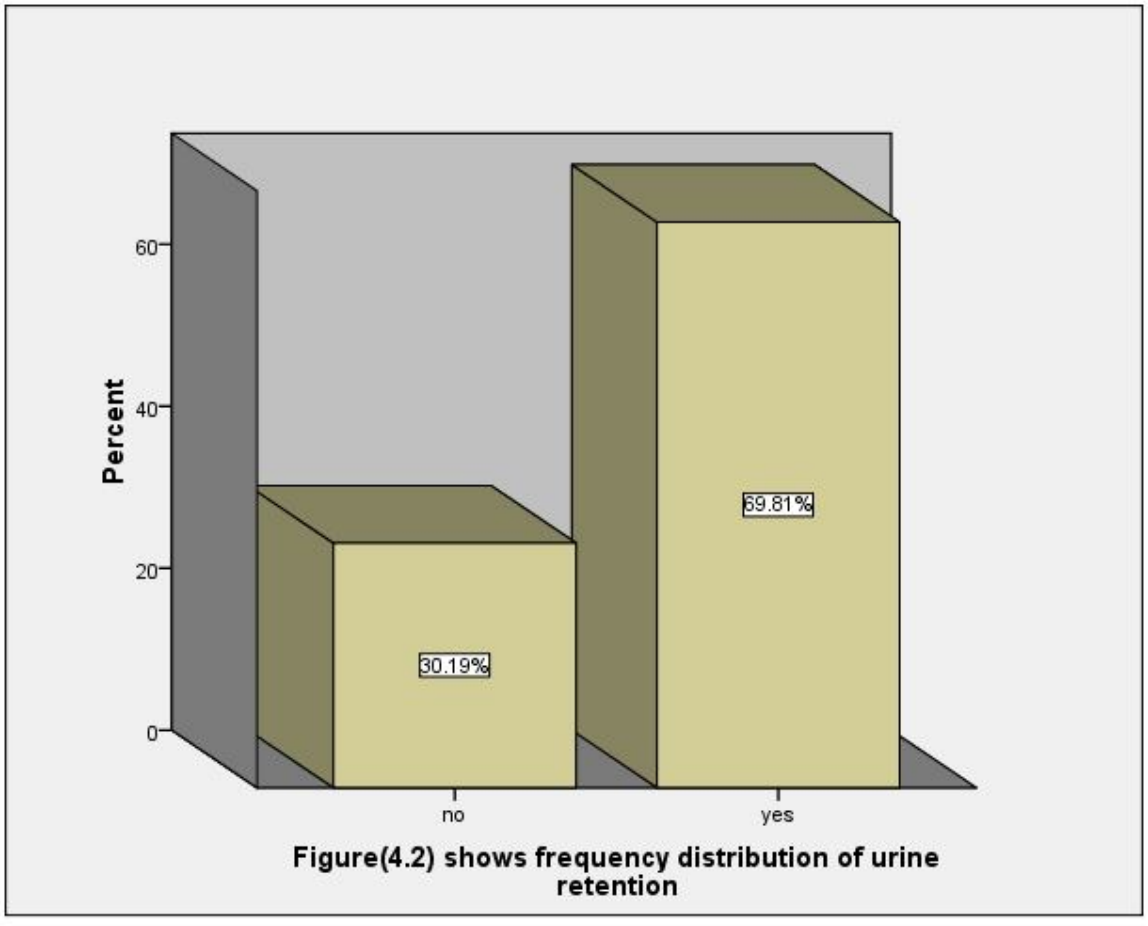


Figure (4.1) shows frequency distribution of age group

Table (4.2)shows frequency distribution of Urine retention in BPH patient's

Urine retention	Frequency	Percent	Valid Percent	Cumulative Percent
No	16	30.2	30.2	30.2
Yes	37	69.8	69.8	100.0
Total	53	100.0	100.0	



Figure(4.2) shows frequency distribution of urine retention

Table(4.3)showsfrequencydistribution of pelvic pain in BPH patient's

Pelvic pain	Frequency	Percent	Valid Percent	Cumulative Percent
no	16	30.2	30.2	30.2
yes	37	69.8	69.8	100.0
Total	53	100.0	100.0	

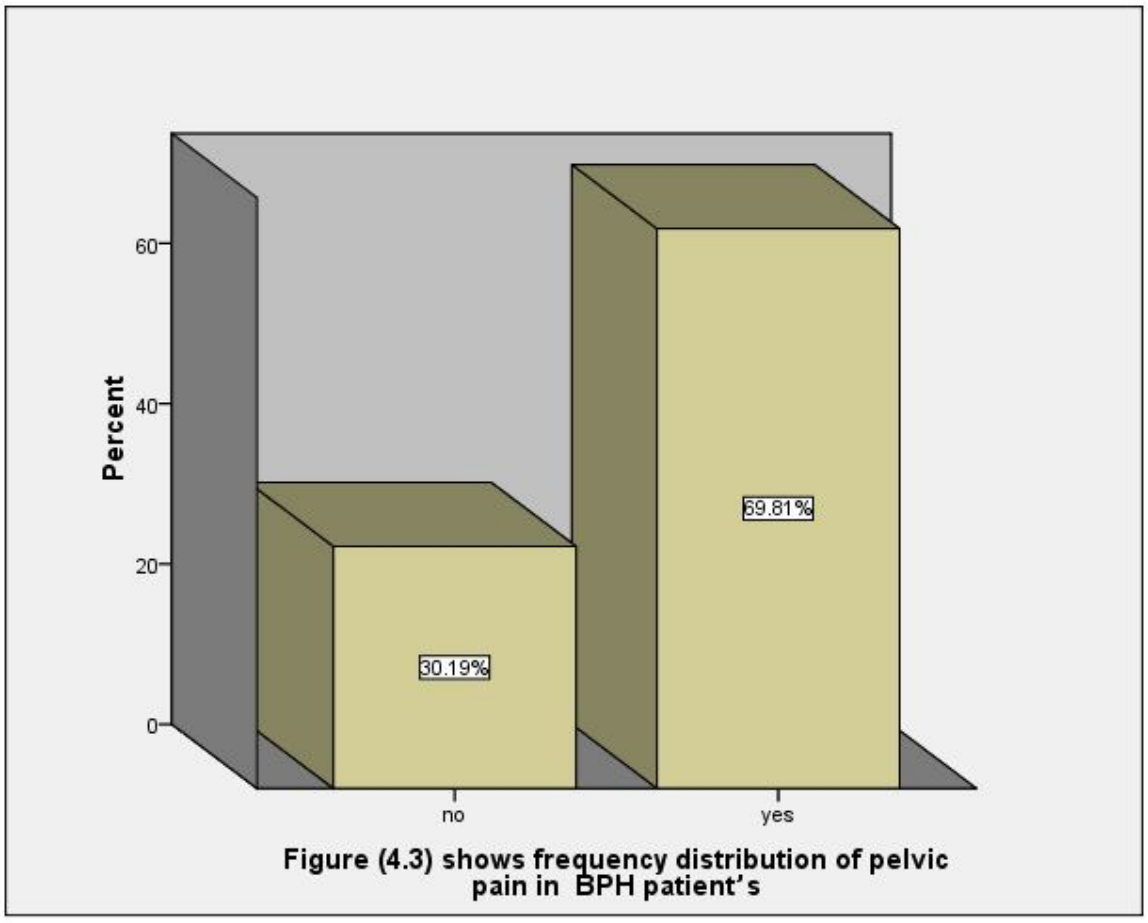


Figure (4.3) shows frequency distribution of pelvic pain in BPH patient's

Table (4.4) shows frequency distribution of PSA in BPH patient's

PSA	Frequency	Percent	Valid Percent	Cumulative Percent
1- 5	3	5.7	5.7	5.7
5.1 -10	30	56.6	56.6	62.3
10.1- 15	17	32.1	32.1	94.3
15.1- 20	1	1.9	1.9	96.2
20.1- 25	1	1.9	1.9	98.1
more than 25	1	1.9	1.9	100.0
Total	53	100.0	100.0	
Minimum =4.5 , maximum = 26, mean =9.7013, std= 4.04727				

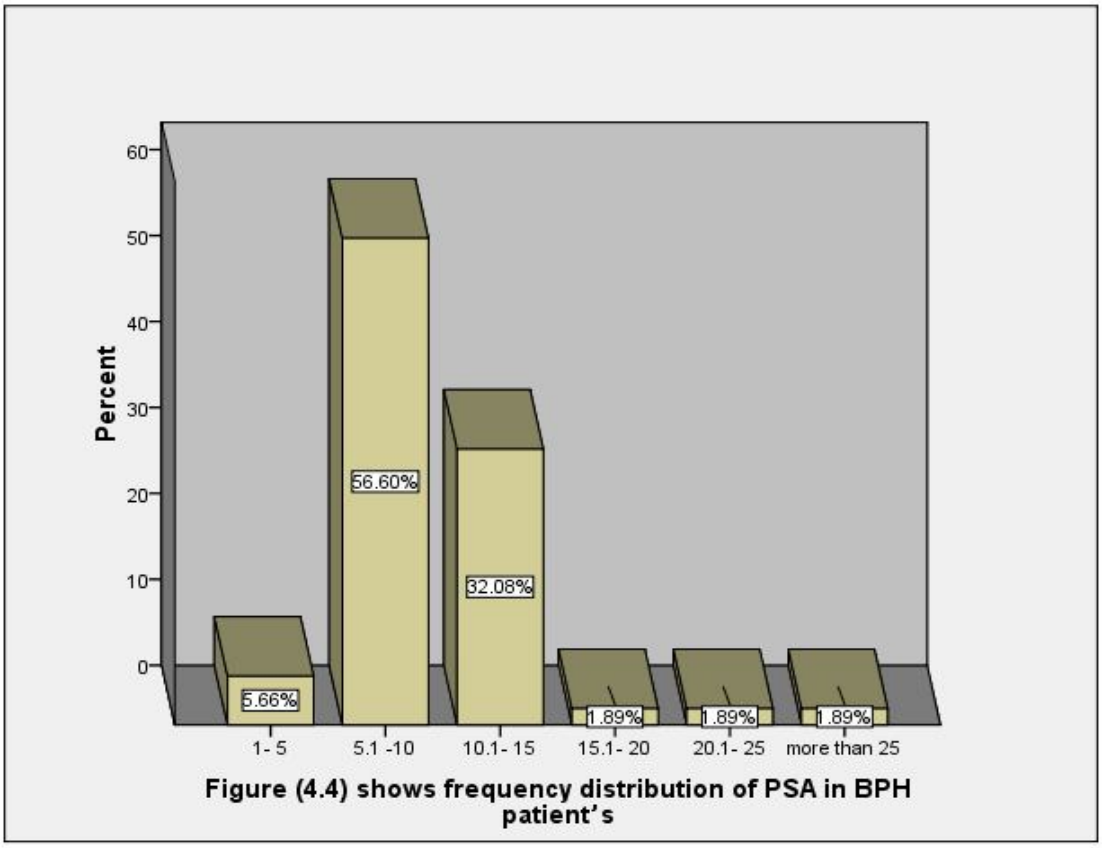
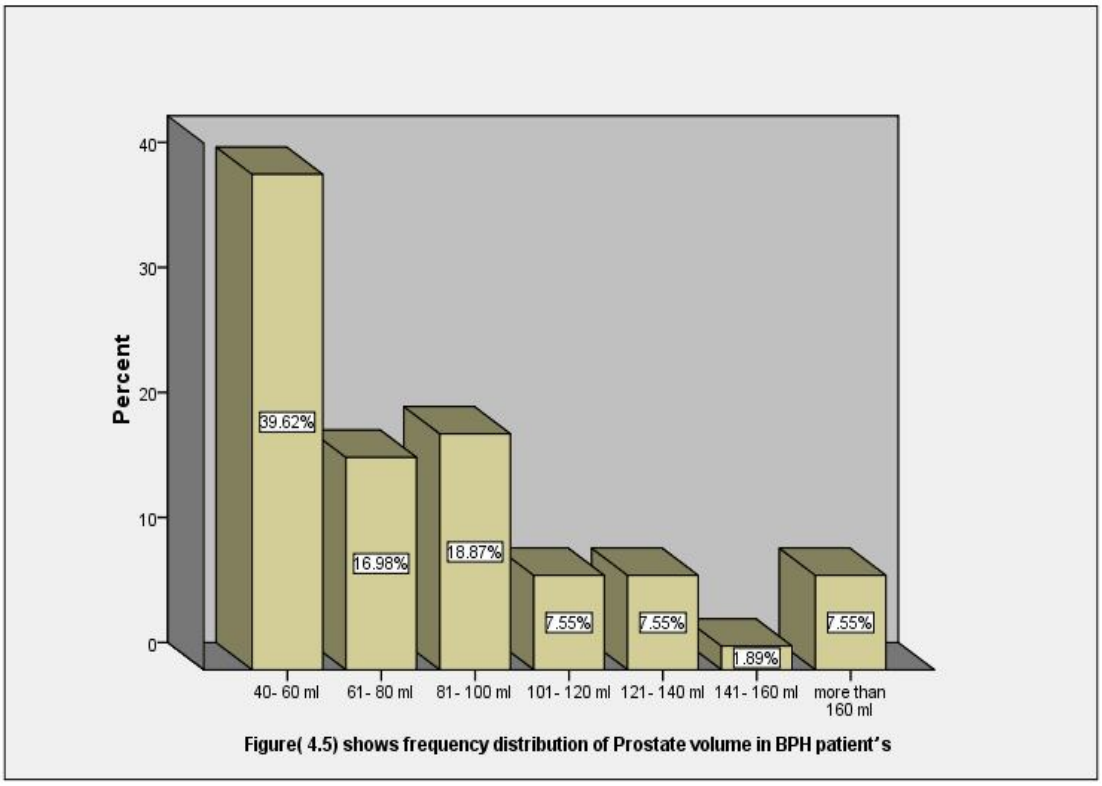


Figure (4.4) shows frequency distribution of PSA in BPH patient's

Table (4.6)a shows frequency distribution of capsule shape in BPH patient's

Prostate volume	Frequency	Percent	Valid Percent	Cumulative Percent
40- 60 ml	21	39.6	39.6	39.6
61- 80 ml	9	17.0	17.0	56.6
81- 100 ml	10	18.9	18.9	75.5
101- 120 ml	4	7.5	7.5	83.0
121- 140 ml	4	7.5	7.5	90.6
141- 160 ml	1	1.9	1.9	92.5
more than 160 ml	4	7.5	7.5	100.0
Total	53	100.0	100.0	
Minimum = 43 , maximum = 221, means = 83.0151, std= 40.66879				



Figure(4.5) shows frequency distribution of Prostate volume in BPH patient's

Table (4.6)b shows frequency distribution of capsule shape in BPH patient's

Capsule shape	Frequency	Percent	Valid Percent	Cumulative Percent
regular	33	62.3	62.3	62.3
irregular	20	37.7	37.7	100.0
Total	53	100.0	100.0	

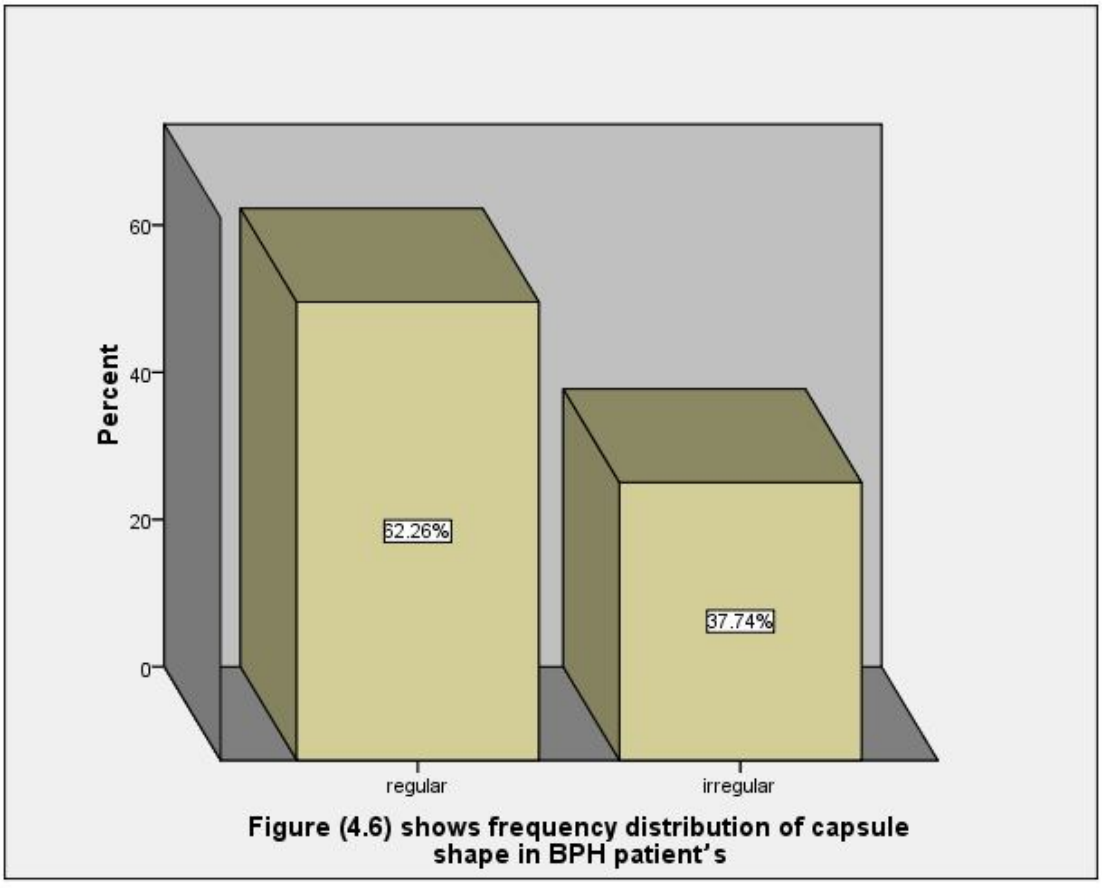


Figure (4.6) shows frequency distribution of capsule shape in BPH patient's

Table (4.7) frequency distribution of calcification in BPH patient's

Calcification	Frequency	Percent	Valid Percent	Cumulative Percent
no calcification	42	79.2	79.2	79.2
calcification	11	20.8	20.8	100.0
Total	53	100.0	100.0	

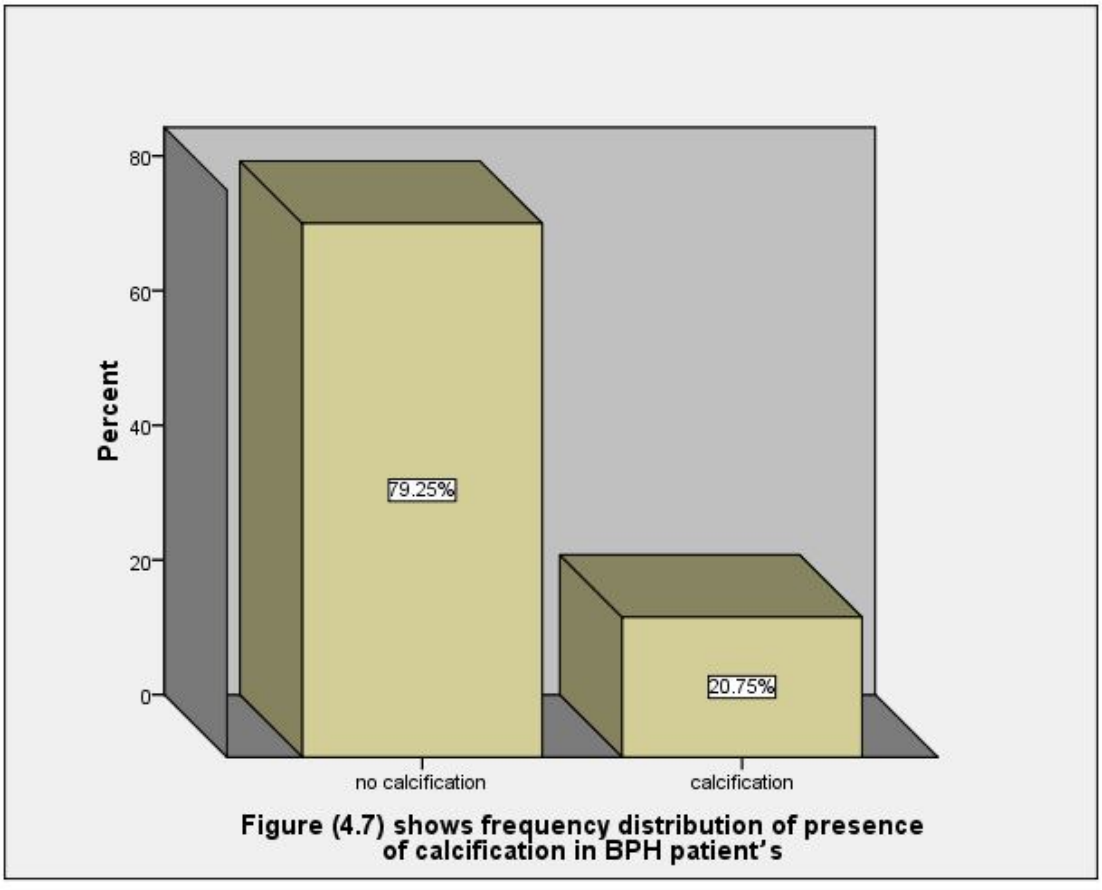


Figure (4.7) shows frequency distribution of presence of calcification in BPH patient's

Table (4.8)showsfrequency distribution of presence of hydronephrosi in BPH patient, s

Hydronephrosis	Frequency	Percent	Valid Percent	Cumulative Percent
absent	48	90.6	90.6	90.6
present	5	9.4	9.4	100.0
Total	53	100.0	100.0	

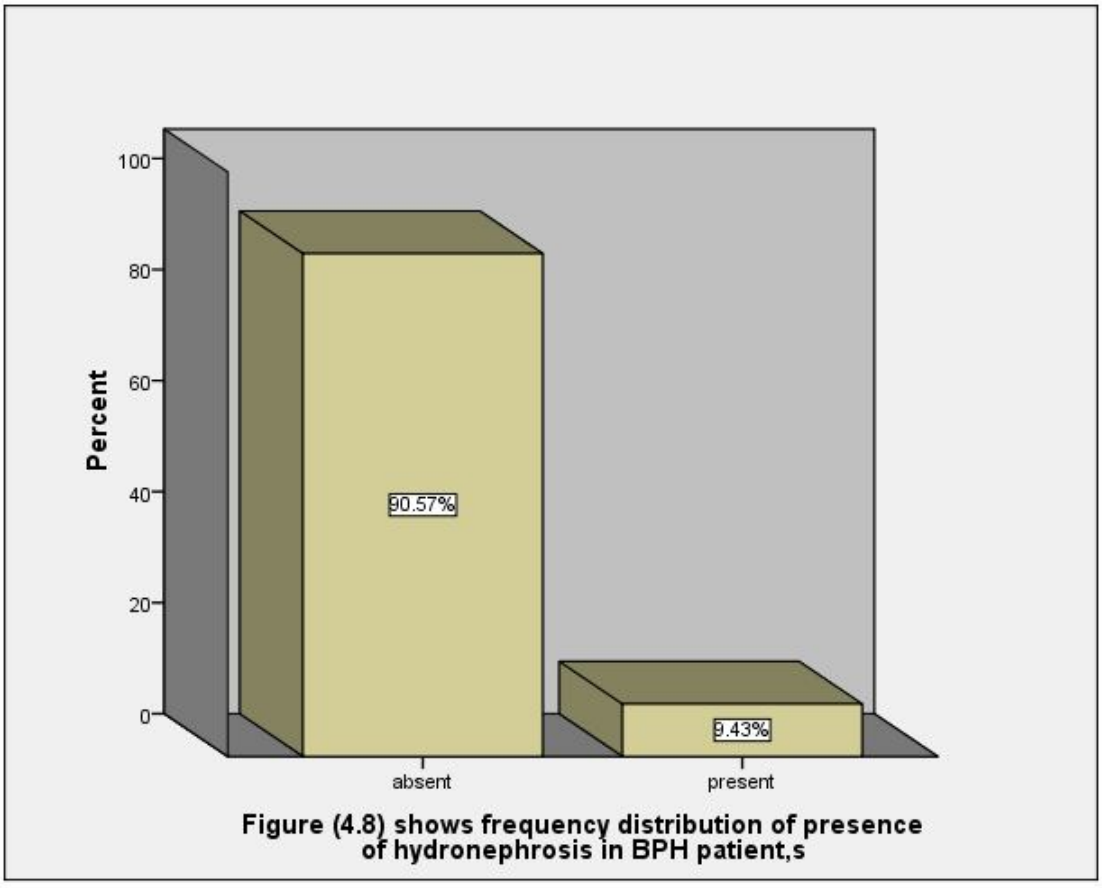


Figure (4.8) shows frequency distribution of presence of hydronephrosis in BPH patient,s

Table (4.9) a- cross tabulation between age and prostate volume

Age group	Prostate volume							Total
	40- 60 ml	61- 80 ml	81- 100 ml	101- 120 ml	121- 140 ml	141- 160 ml	more than 160 ml	
50 - 60 years	10	3	1	0	1	1	1	17
61-70 years	11	4	3	1	1	0	2	22
71- 80 years	0	1	5	3	1	0	1	11
more than 80 years	0	1	1	0	1	0	0	3
Total	21	9	10	4	4	1	4	53

Table (4.9) b- chi square between age and prostate volume

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	27.875[a]	18	.064
Likelihood Ratio	30.965	18	.029
Linear-by-Linear Association	4.196	1	.041
N of Valid Cases	53		
a. 26 cells (92.9%) have expected count less than 5. The minimum expected count is .06.			

Table (4.9) c- symmetric measure between age and prostate volume

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.284	.126	2.116	.039[c]
Ordinal by Ordinal	Spearman Correlation	.404	.121	3.154	.003[c]
N of Valid Cases		53			
a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis. c. Based on normal approximation.					

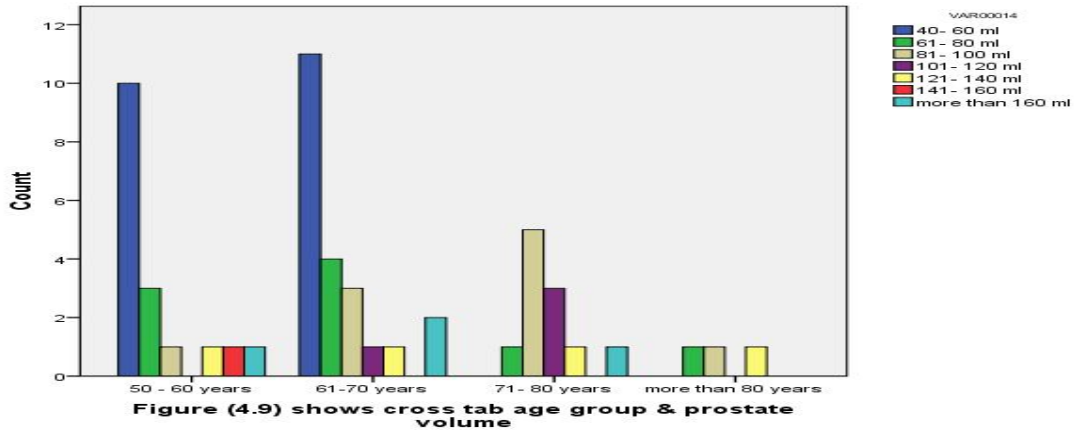


Figure (4.9) shows cross tab age group & prostate volume

Table (4.10) a- cross tabulation between PSA and prostate volume

PSA	Prostate volume							Total
	40- 60 ml	61- 80 ml	81- 100 ml	101- 120 ml	121- 140 ml	141- 160 ml	more than 160 ml	
1- 5	3	0	0	0	0	0	0	3
5.1 -10	16	7	4	1	1	0	1	30
10.1- 15	2	2	6	3	2	1	1	17
15.1- 20	0	0	0	0	1	0	0	1
20.1- 25	0	0	0	0	0	0	1	1
more than 25	0	0	0	0	0	0	1	1
	21	9	10	4	4	1	4	53

Table (4.10) b- chi square between PSA and prostate volume

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	56.861[a]	30	.002
Likelihood Ratio	37.174	30	.172
Linear-by-Linear Association	22.328	1	.000
N of Valid Cases	53		
a. 38 cells (90.5%) have expected count less than 5. The minimum expected count is .02.			

Table (4.10)c- symmetric measure between PSA and prostate volume

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.655	.098	6.195	.000[c]
Ordinal by Ordinal	Spearman Correlation	.624	.093	5.696	.000[c]
N of Valid Cases		53			
a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis. c. Based on normal approximation.					

Table (4.11) correlation between age and prostate specific antigen

			age	PSA
Spearman's rho	age	Correlation Coefficient	1.000	.251
		Sig. (2-tailed)	.	.069
		N	53	53
	PSA	Correlation Coefficient	.251	1.000
		Sig. (2-tailed)	.069	.
		N	53	53

Table (4.12) correlation between age and prostate volume

			age	Prostate volume
Spearman's rho	Age	Correlation Coefficient	1.000	.407**
		Sig. (2-tailed)	.	.003
		N	53	53
	Prostate volume	Correlation Coefficient	.407**	1.000
		Sig. (2-tailed)	.003	.
		N	53	53
**. Correlation is significant at the 0.01 level (2-tailed).				

Table (4.13) correlation between prostate volume and prostate specific antigen

			Prostate volume	PSA
Spearman's rho	Prostate volume	Correlation Coefficient	1.000	.712**
		Sig. (2-tailed)	.	.000
		N	53	53
	PSA	Correlation Coefficient	.712**	1.000
		Sig. (2-tailed)	.000	.
		N	53	53
**. Correlation is significant at the 0.01 level (2-tailed).				

Table (4.14) a- cross tabulation between hydronephrosis and prostate volume

Prostate volume	Hydronephrosis		Total
	Absent	present	
40- 60 ml	21	0	21
61- 80 ml	9	0	9
81- 100 ml	10	0	10
101- 120 ml	2	2	4
121- 140 ml	3	1	4
141- 160 ml	0	1	1
more than 160 ml	3	1	4
Total	48	5	53

Table (4.14) b- chi square between hydronephrosis and prostate volume

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	23.740[a]	6	.001
Likelihood Ratio	18.579	6	.005
N of Valid Cases	53		
a. 11 cells (78.6%) have expected count less than 5. The minimum expected count is .09.			

Table (4.15) a- cross tabulation between calcification and prostate volume

Prostate volume	Calcification		Total
	no calcification	calcification	
40- 60 ml	21	0	21
61- 80 ml	7	2	9
81- 100 ml	6	4	10
101- 120 ml	3	1	4
121- 140 ml	2	2	4
141- 160 ml	0	1	1
more than 160 ml	3	1	4
Total	42	11	53

Table (4.15) b- chi square between calcification and prostate volume

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.750[a]	6	.033
Likelihood Ratio	16.596	6	.011
N of Valid Cases	53		
a. 11 cells (78.6%) have expected count less than 5. The minimum expected count is .21.			

Table (4.16) a- cross tabulation between calcification and age

Age	Calcification		Total
	no calcification	calcification	
50 - 60 years	16	1	17
61-70 years	18	4	22
71- 80 years	7	4	11
more than 80 years	1	2	3
Total	42	11	53

Table (4.16) b- chi square test between calcification and age

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.849[a]	3	.049
Likelihood Ratio	7.425	3	.060
N of Valid Cases	53		
a. 5 cells (62.5%) have expected count less than 5. The minimum expected count is .62.			

Table (4.17) a- cross tabulation between prostate volume and capsule shape

Prostate volume	Capsule shape		Total
	Regular	irregular	
40- 60 ml	19	2	21
61- 80 ml	6	3	9
81- 100 ml	4	6	10
101- 120 ml	2	2	4
121- 140 ml	0	4	4
141- 160 ml	0	1	1
more than 160 ml	2	2	4
	33	20	53

Table (4.17) b- chi square between prostate volume and capsule shape

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.060[a]	6	.006
Likelihood Ratio	21.036	6	.002
N of Valid Cases	53		
a. 10 cells (71.4%) have expected count less than 5. The minimum expected count is .38.			

Table (4.18) a- cross tabulation between age and capsule shape

Age	Capsule shape		Total
	Regular	irregular	
50 - 60 years	13	4	17
61-70 years	16	6	22
71- 80 years	4	7	11
more than 80 years	0	3	3
Total	33	20	53

Table (4.18) b- chi square between age and capsule shape

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.576[a]	3	.014
Likelihood Ratio	11.499	3	.009
N of Valid Cases	53		
a. 3 cells (37.5%) have expected count less than 5. The minimum expected count is 1.13.			

Table (4.19) a- cross tabulation between urine retention and prostate volume

Retention of urine	VAR00014							Total
	40-60 ml	61- 80 ml	81-100 ml	101- 120 ml	121-140 ml	141- 160 ml	more than 160 ml	
No	13	2	1	0	0	0	0	16
Yes	8	7	9	4	4	1	4	37
Total	21	9	10	4	4	1	4	53

Table (4.19) b- chi square between urine retention and prostate volume

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.850[a]	6	.007
Likelihood Ratio	20.974	6	.002
N of Valid Cases	53		
a. 10 cells (71.4%) have expected count less than 5. The minimum expected count is .30.			

5.1 Discussion

This study was cross sectional descriptive study done to evaluate Benign prostatic hyperplasia by ultrasound.

Concerning the pt age most of BPH pt are in age group from 61-70 years old (22)of(53) (41.5%) table(4.1). This result agree with the result of previous study done by Mutaz Ibrahim Yasien Ahmed, he was shown that the BPH peak in age group of (60-69 years) which is differ from the study results done by Mohammed Elsamani et al(2016) which shown that the BPH peak in age group of (70-80 years).

Most of patient suffering from urine retention and pelvic pain (37)of(53) (69.8%.)table(4.2)(4.3)This result is slightly disagree of previous result done by Elfatih Mohammed(2007) , he was shown that urine retention(49%) .

The mean PSA(9.7) ranging from(4)ng/ml to (26)ng/ml table (4.4).

The mean prostate volume (83.01)gm with range from(30)gm to (221)gm table (4.5)

There is Strong significant correlation between prostate specific antigen andprostate volume r= 0.000 , p value = 0.002. table(4.10).

This result agree with the result of pervious study done byAwad Ali M. Alawad et .al(2014) witch shown there is linear relationship between PSA levels and prostate size. Those with a prostate size of > 40 ml were found to be more likely to have high PSA mean level.

PSA mean values were found to be associated with age (P <0.006).

Ultra sound examination in respect to capsule shape showed that (33)of (53)(62.3)% had normal capsule while in (20) (37.7)%iregular capsule table(4.6).

In most of these cases no calcification changes detected(42)(79.2)%, but only (11)(20.7)% detected table(4.7) , this result is slightly agree with

pervious study done by Mohammed Elsamani et ,al(2016)witch shown(20)% of calcification changes.

There were only(5) pt(9.4)% with hydronephrosis ,while(48) (90.6)% had no hydro nephrosis table(4.8) , this result agree with the result of Elfatih Mohammed (2007)who found (7) pt with hydro nephrosis(15)% of all BPH patients.

Strong positive correlation between pt age and prostate volume r= 0.003 with no significant difference p value = 0.06, Strong significant correlation between prostate specific antigen and prostate volume r= 0.000 , p value = 0.002

No significant correlation found between age and PSA value r = 0.069 , sperman,s rho correlation coefficient = 0.251, Significant difference between calcification and age p value (0.049), NO Significant difference between urine retention and prostate volume p value (0.007), Strong positive significant correlation between age and prostate volume spearman,s correlation coefficient = .407** , r= 0.003, Significant difference between ages and capsule shape p value (0.014), NO Significant difference between capsule shape and prostate volume p value (0.001), Significant difference between calcification and prostate volume p value (0.03), NO Significant difference between hydronephrosis and prostate volume p value (0.001), Strong positive significant correlation between PSA and prostate volume spearman,s correlation coefficient = .712** , r= 0.000

5.2 Conclusion:

Ultrasound is an effective imaging modality in evaluate benign prostate hyper plasia.

The study showed that most of BPH patients are in age group from (61-71) years old (41.5)%. The mean prostate volume (83.01) gm andthe mean PSA(9.7)ng/ml.

There is Strong positive correlation between pt age and prostate volume andStrong significant correlation between prostate specific antigen and prostate volume .

(62.3)% had normal capsule and (37.7)%had irregular capsule. Hydronephrosis and calcification are least common in BPH patients ((9.4)%(20.8)% respectively.

5.3 Recommendations:

1- Ultra sound examination is easy available, less expensive and non invasive. The researcher has come out with following recommendations.

2- Transabdominal ultrasound scanning should be used in evaluation of prostatic enlargement in every elder patient because it is being saved, cheap, unconsumed time, accurate and easy to operate.

3- Complete abdomenopelvicsonographic examinations should be done to detect any associated pathologies and / or complications.

4- More studies should be conducted using T.R.U.S

5- Futher studies to correlate between prostate size and residule urine volume

References:

Jump upCunningham GR, Kadmon D. "Epidemiology and pathogenesis of benign prostatic hyperplasia." UpToDate; updated Sep.
10, 2013

Indian J Pharmacol. 2011 Feb; 43(1): 6–12.

Arthur C, Guyton, John E. Hall, Text book of medical physiology, 10th edition, 918: 22 WP, USA 2002.

AuffenbergKattan, M.

W, Eastham, J.A (2009). Defining biochemical recurrence of prostate cancer after radical prostate ectomy: a proposal for a standarlized definition. Journal of clinical oncology: 24: 3973

Betty Bates and Tempkin, Ultra sound scanning principles and protocols, 2nd edition, 664: 9.W.B. 1993.

Deam, Trtr, Roms, Rdcs. Diagnostic ultrasound for abdomen & small part, module 10 Ad.Burwin institute of diagnostic ultrasound P. 74, 81, 82, 87.

Dr.Kuupe.blogspot.com.2011.

Epstein, J. I., Partain, A.W, sauvageot, J. (2005) prediction of progression following radical prostatectomy A multivariate analysis of 721 men with long term follow up. A merican journal surgical pathology, 20: 286.

Fitz Patric, JM (2008), Management of localized prostate cancer in senior adults the curical role of comorbidity" Bju International 101 Supplz: 10:22.

Hanley &Belfus.Ultra sound secrets, 199.21 USA 2004.

Luiz Carlos, JunqueriaJosoCarniero . Basic Histology text and atlas, 11th edition 429: 32 MeGraw Hill

Meyers. Robert P “structure of the adult prostate” clinical anatomy 13 (2000): 24-15 June 2010.

Miller DC, Hafez KS, Stewart A, Montie JE, Wei JT (September 2003). "Prostate carcinoma presentation, diagnosis, and staging: an update form the National Cancer Data Base".

Montironi R, Mazzu “Chell: R, Lopez. Bettran A, Chengl, scanoelli M (June 2007)” mechanism of disease: high grade prostatic intra epithelial neoplasia and other proposed preneoplastic lesions in prostate Nat (linpracturol 4(6): 321-32.

Potts JM. The four categories of prostatitis: a practical approach to treatment. Cleve clin J med 2001; 68: 389. 90, 392.3, 397

Richards. Snell: Clinical anatomy Applied and Regional 7th edition: P 378: 82, Lippin, London 1992.

RNM, Mac Swen, Whaley: Muir's textbook of pathology. India, Edition 13; P 1068. 1992.

Springer.com Embryology of the prostate. 2011.

Sundral. Hagen. Ansert. Text book of diagnostic ultra sound graphy, volum 1 5th edition, 423: 7, mosby company 2001.

Syed A mirGilany, Ultra sound scanning, Guid line and protocols 1st edition, 42:4 Burwin institute of ultrasound, Philadelphia 2002.

Webbmed LLC.2008

Wolf, S.H (2005). Screening for prostate cancer with prostate specific antigen: An examination of the evidence. The new England journal of medicine, 333: 1401.

WWW.about cancer.com/prostate anatomy images.ultra sound.htm

WWW.deltagen/com/target/histology/atlas.file..

WWW.nature.com/nrc/journal/v7/n4/fig/tab/nrc2009

WWW.yourcancer tody.comcancers/prostate.cancer2012 1

Roderick N M MacSween, Keith Whaley. Muri's Textbook of Pathology,

13th edition, 1065: 7, Arnold, London 1992.

Appendix A

Sudan University of Science and Technology
Facility of Graduate Studies
Data Collection Sheet

Evaluation Of Benign Prostatic Hyper Plasia Among Adult Sudanese By Ultrasound

(Data collection sheet)

Date No

Name Age

Clinical finding

Urine retention ( ) Pelvic pain ( )

Lab Finding

P S A ( )

Ultra sound finding

Prostate volume ( )

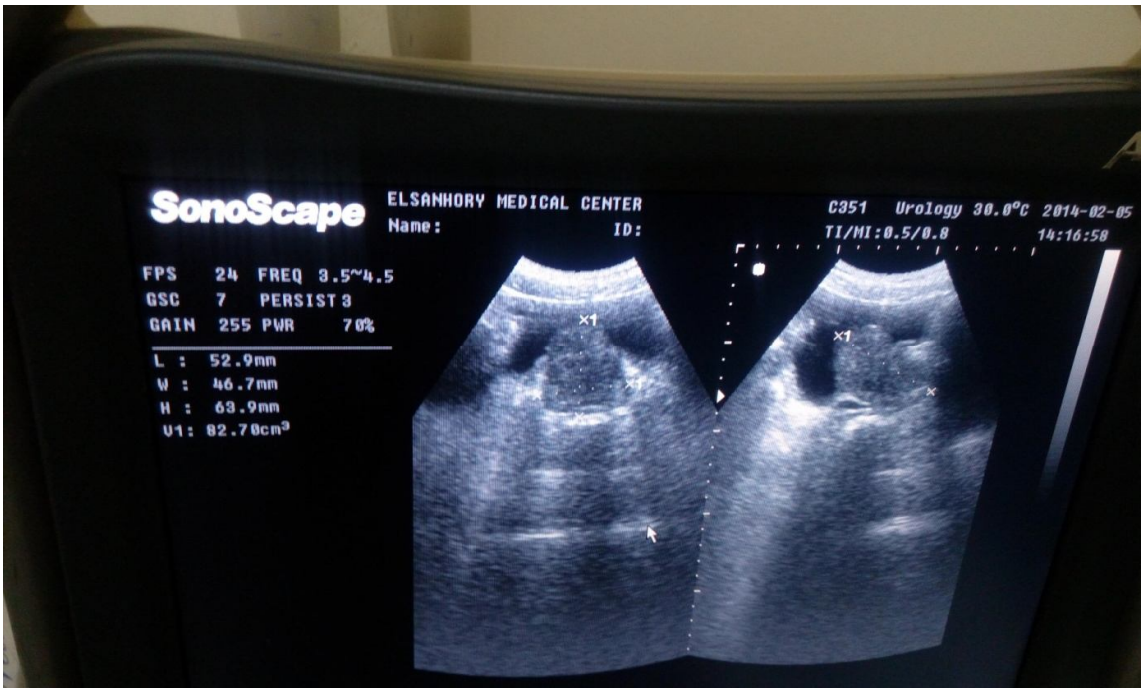
Prostate Capsule :-

Normal ( ) Irregular ( )

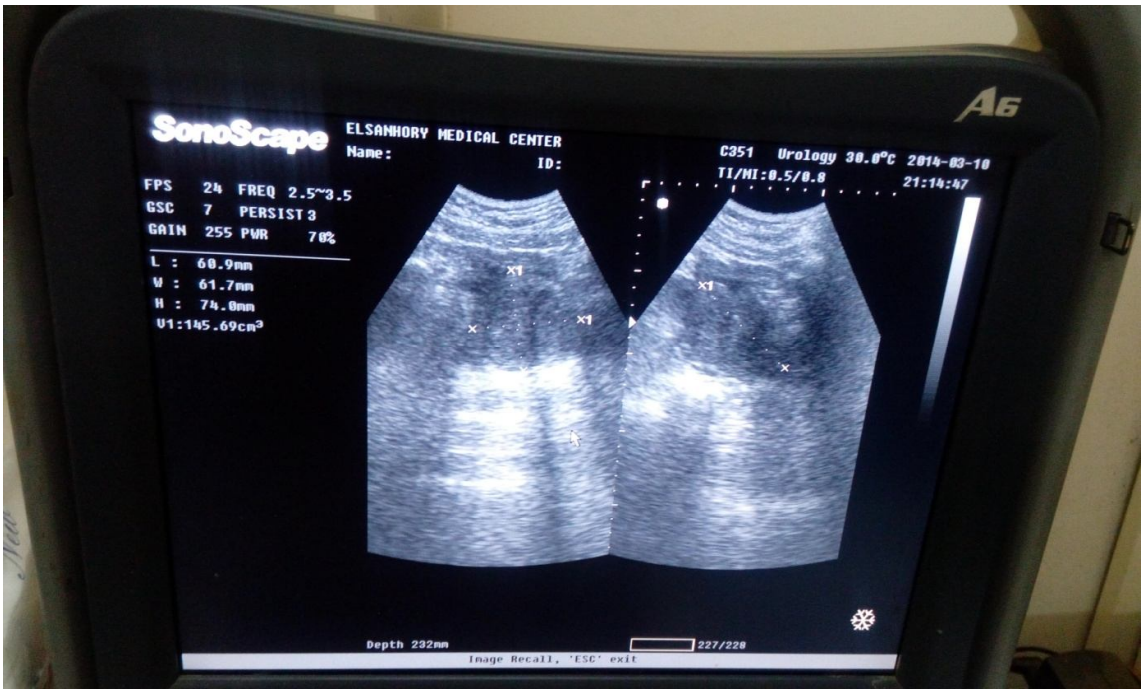
Calcification ( )

Hydronephrosis ( )

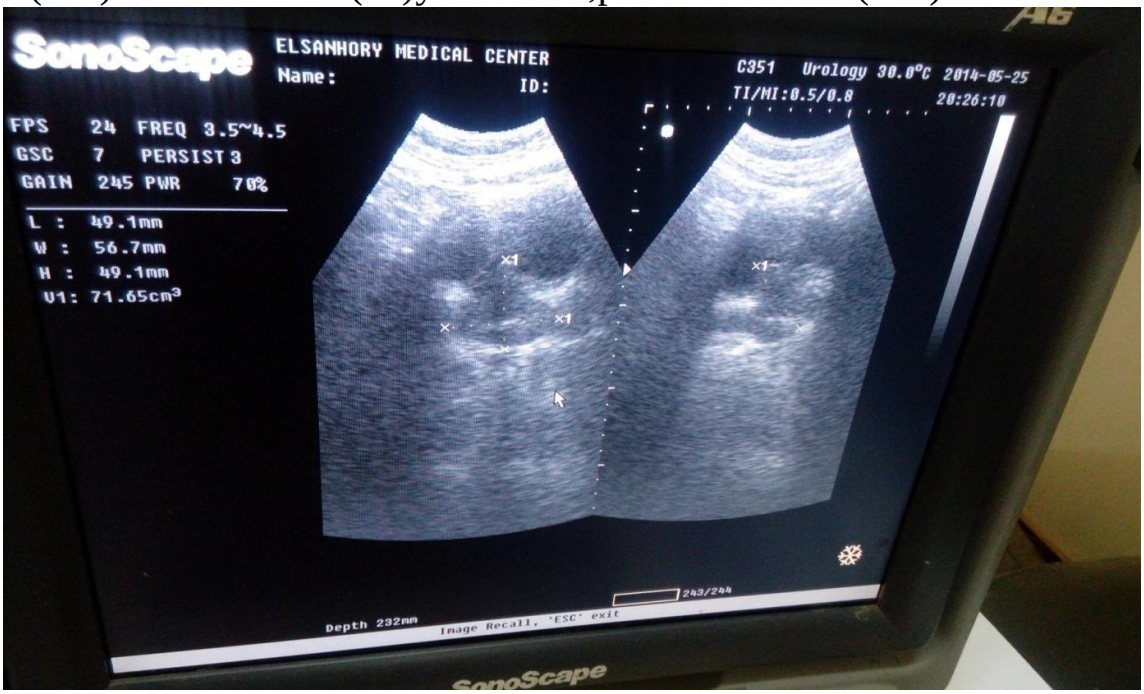
Appendix B



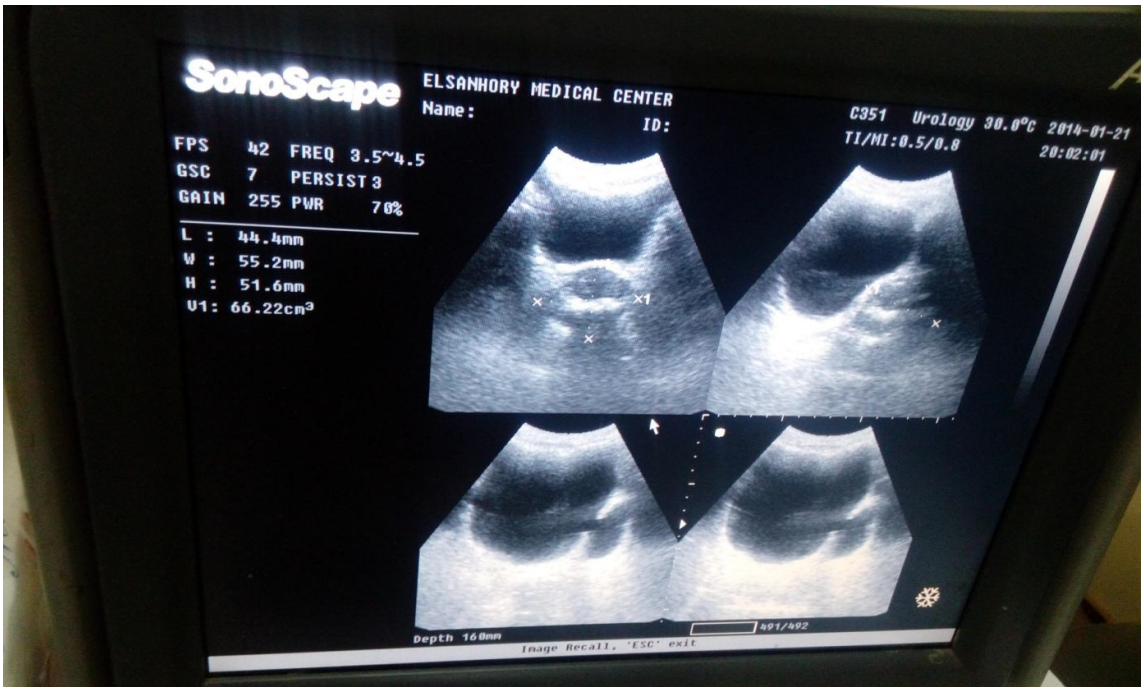
A(B.1)Shows BPH in(65)years male,prostate volume(82)cc



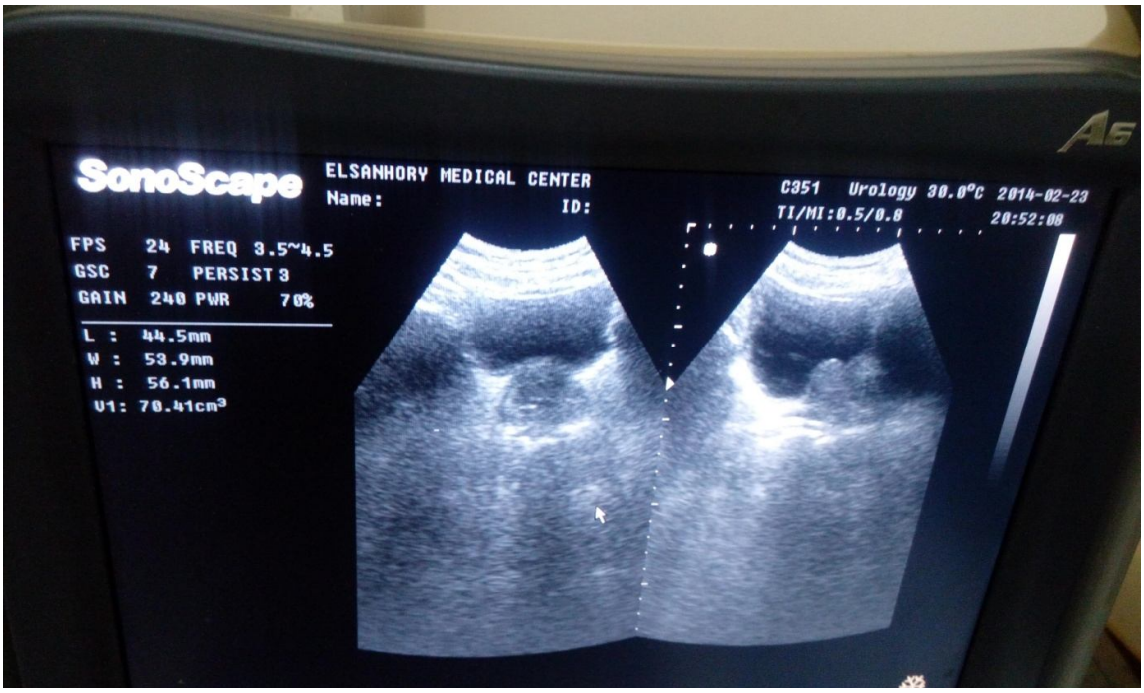
A(B.2)Shows BPH in(73)years male,prostate volume(145)cc



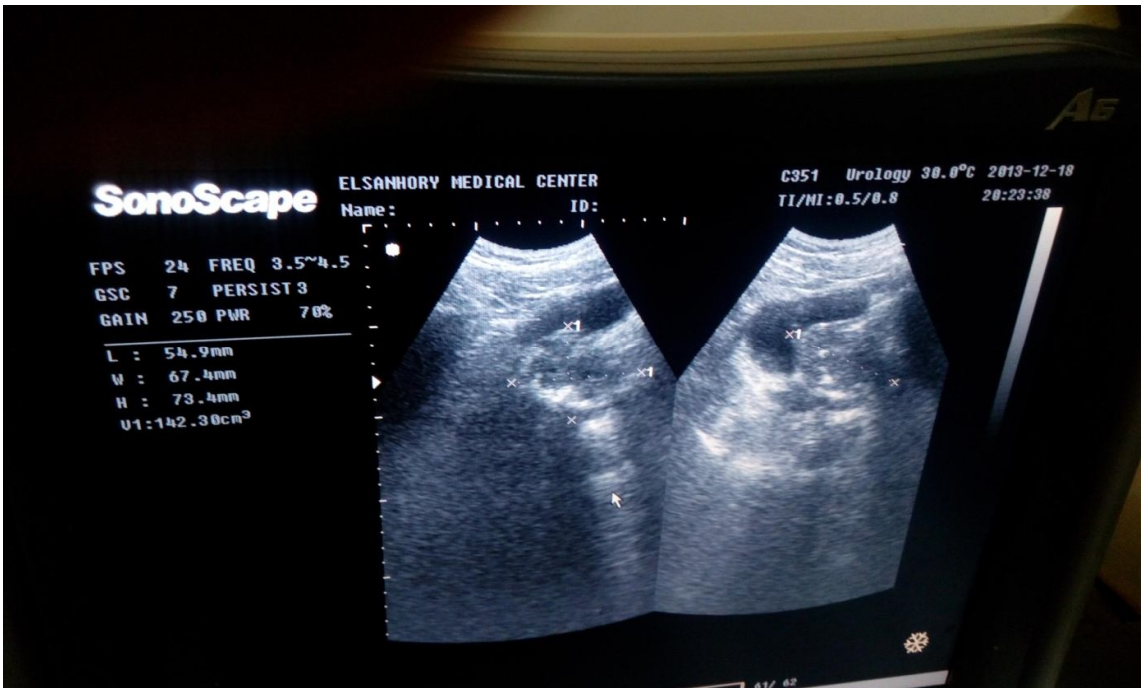
A(B.3)Shows BPH in(78)years male,prostate volume(71)cc



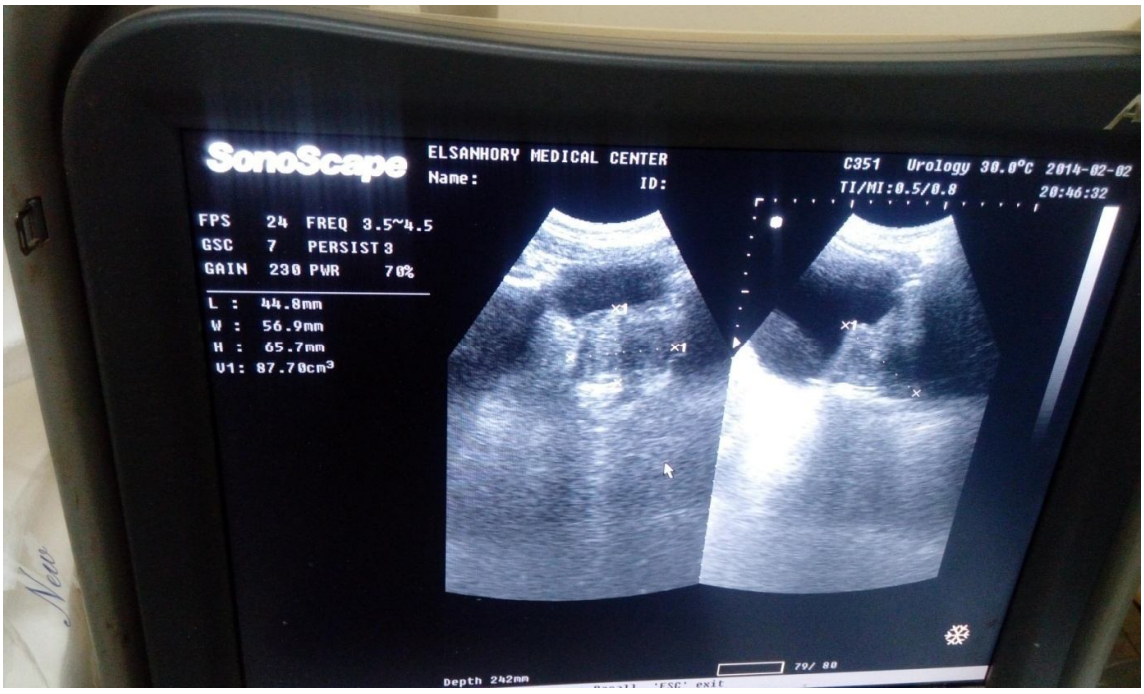
A(B.4)Shows BPH&diverticulm in(58)years male,prostate volume(66)cc



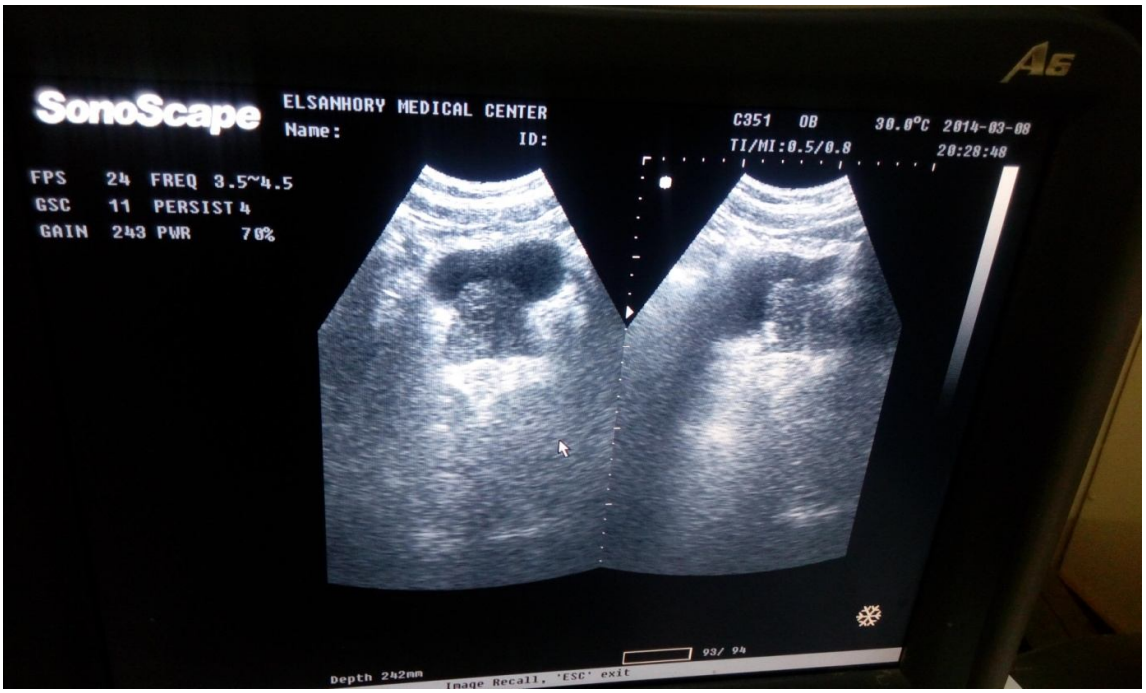
A(B.5)ShowsBPH in(63)years male,prostate volume(70)cc



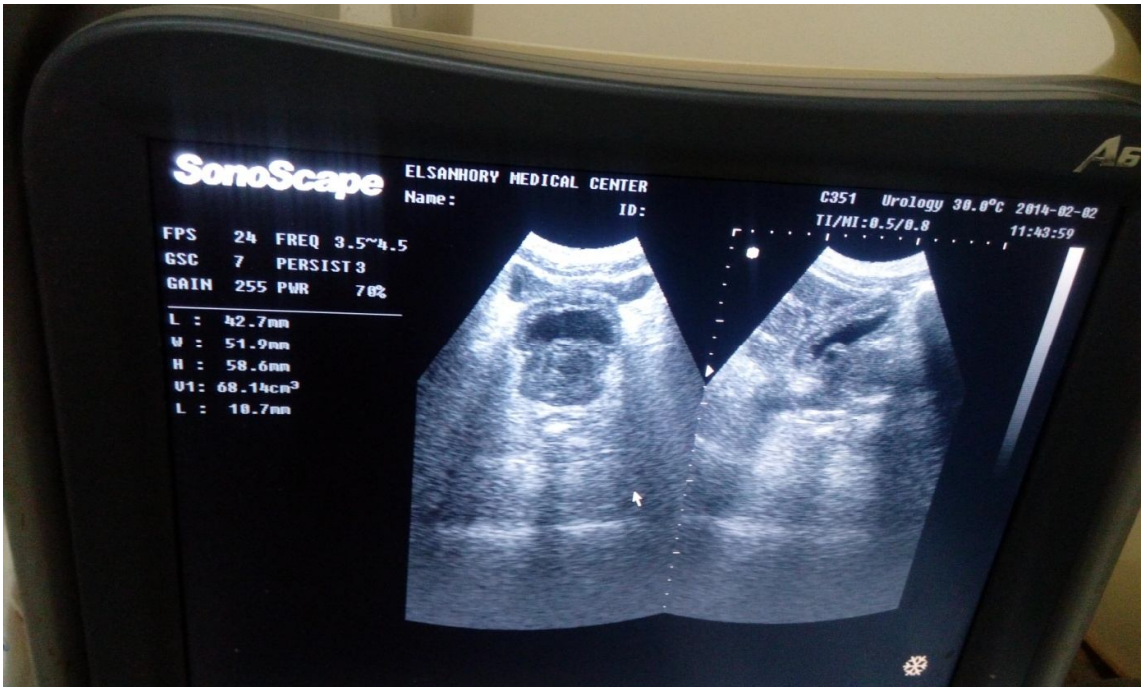
A(B.6)Shows BPH in(84)years male, prostate volume(142)cc



A(B.7)ShowsBPH in(71)years male, prostate volume(87)cc

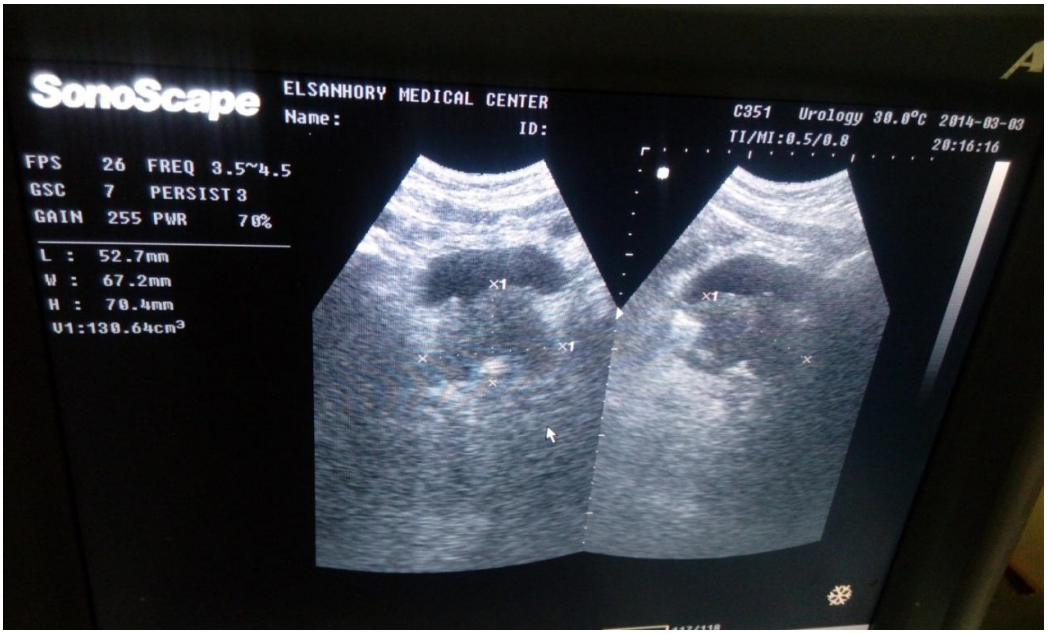


A(B.8)ShowsBPH in(78)years male,prosate volume(243)cc

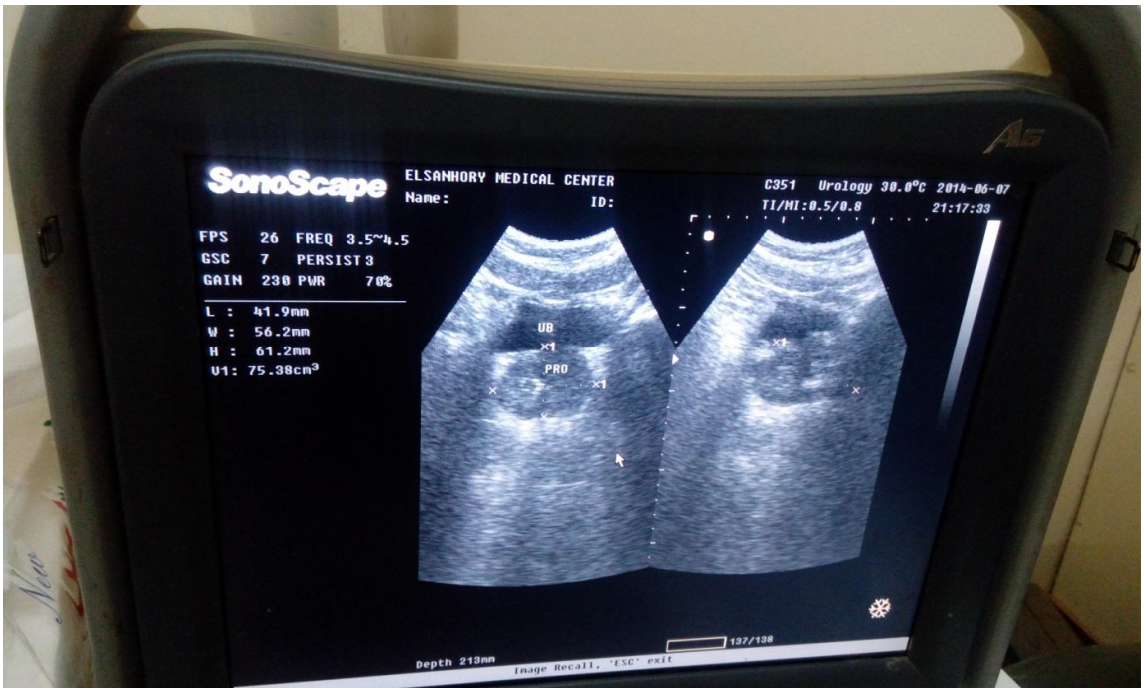


A(B.9)ShowsBPH in(62)years male,prostate volume(68)cc

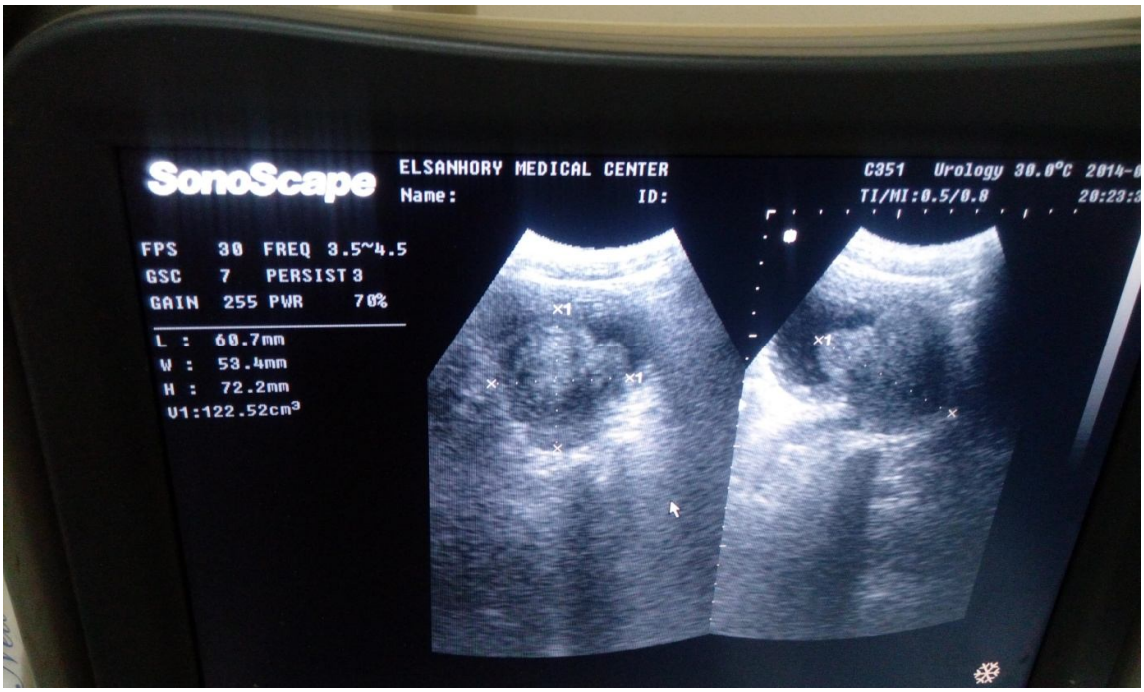
A(B.10)Shows BPH in(76)years male, prostate volume(255)cc



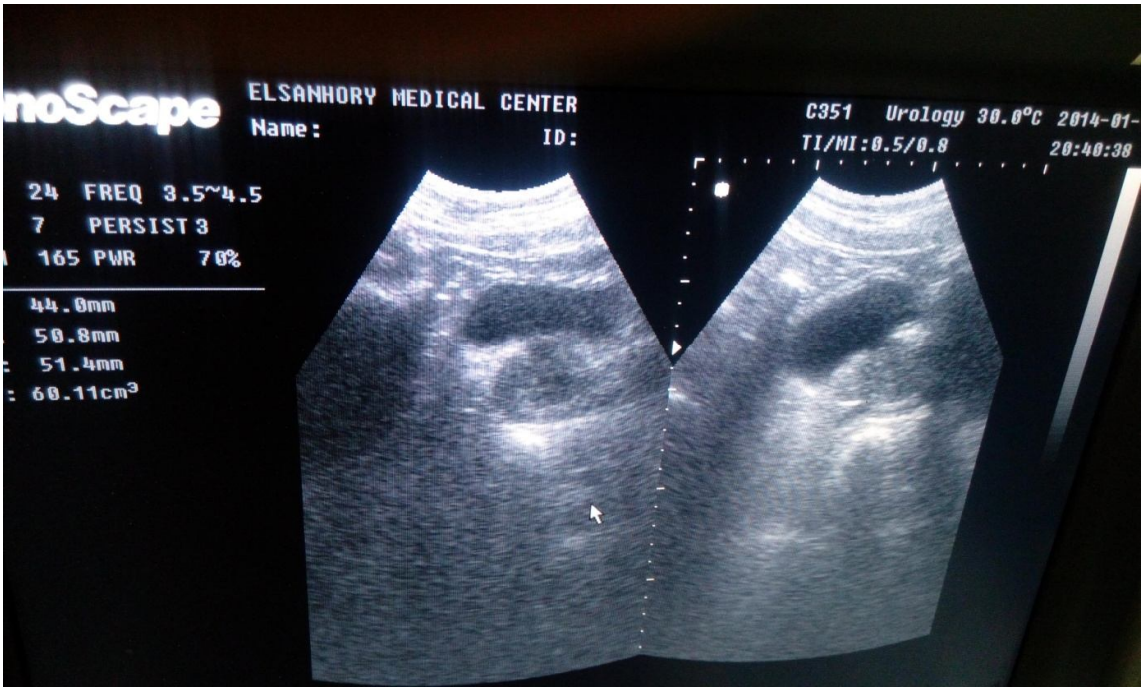
A(B.11)Shows BPH in(75)years male,prostate volume(130)cc



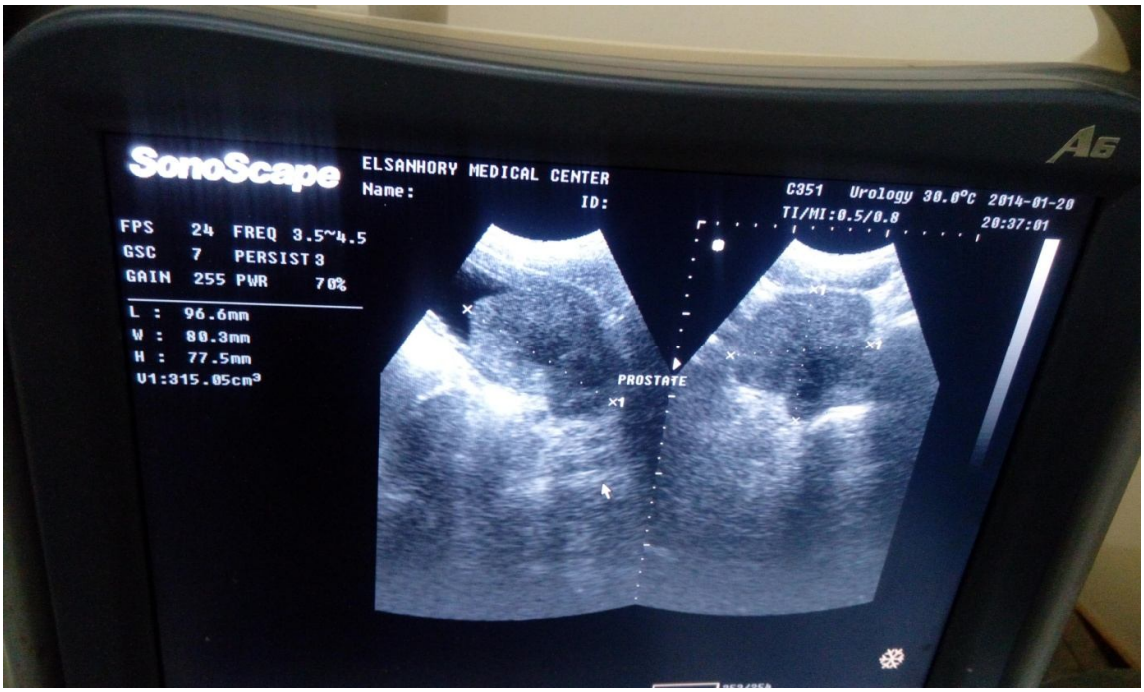
A(B.12)Shows BPH in(60)years male, prostate volume(75)cc



A(B.13)ShowsBPH in(81)years male, prostate volume(122)cc



A(B.14) ShowsBPH in(57)years male, prostate volume(60)cc



A(B.15)Shows BPH in(80)years male, prostate volume