Sudan University of Science and Technology

College of Graduate Studies

Used Sonographic Finding in Diagnosis of Urinary Bladder Disorders in Adult Sudanese Patients

استخدام نتائج الموجات فوق الصوتيه في تشخيص امراض المثانه البوليه لدى المرضى السودانيين البالغين

A thesis Submitted for Partial Fulfillment of the Requirement of MSc Degree in Medical Diagnostic Ultrasound

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الايه

بسم الله الرحمن الرحيم

قال تعالى :

(قال رب اشرح لي صدري* ويسر لي امري* واحلل عقدة من لساني* يفقهوا قولي)

(سورة طه)

الايات (25-28)

Dedication

To whom I should give my all love

To my soft-hearted mother

To my great father

To my best brothers and sisters

Acknowledgment

First of all, I thank Allah the Almighty for helping me complete this project. I Thank doctor: Asmaa Ibrahim, my supervisor, for her help and guidance, doctor Suhaib Alromi. And the whole staff of the collage of medical radiological science, SUST for their great helps and support.

Finally I would like to thank all my friend whom helped and encouraged me.

Abstract

A descriptive study was performed in Sudan in Alobayed city conducted in duration from January to April 2017, It has been done on 100 patients for routine abdominal ultrasound . Shimadzu SDU - 2200 (Japan) (3.5 -5 MHz) convex Megahertz probe are used.

This study was aimed to used the sonographic finding of urinary bladder disorders in adult Sudanese patients.

The data was collected from routine ultrasound scanning, classified, analyzed by using SPSS. The analysis of the results found that the male patients (61%) more than females (39%), most affected age group was in age from 51-70 years (36%). The main findings reflect that the urinary bladder wall thickening is most urinary bladder disease that appear during ultrasound scanning and the diffuse thickening is the common more than the focal, followed by bladder mass53% which calcified as (36.2%) of mass without posterior shadowing, (34%) mass with posterior shadowing (calculi), while 14 (29.8%) are cystic mass. (51%) with normal bladder volume and (49%) large bladder volume .The result represent that the ultrasound is informative method in diagnosing urinary bladder diseases.

The study recommended that the urinary bladder wall thickness is most important sign that must be evaluated whenever scanning the bladder.

مستخلص البحث

دراسة وصفية اجريت في السودان في مدينة الابيض بمركز ود الياس الطبي خلال الفترة من يناير إلى أبريل 2017، وقد تم ذلك على100 مريض للموجات فوق الصوتية الروتينية في البطن. تم استخدام شيمادزو سدو - 2200 (اليابان) (3.5 -5 ميغاهرتز) محدب .

الهدف الرئيسي من هذه الدراسة هو العثور استخدام نتائج الموجات فوق الصوتيه في تشخيص امراض المثانه البوليه لدى المرضى السودانيين البالغين .

تم جمع البيانات من المسح الروتيني بالموجات فوق الصوتية، تصنيفها، وتحليلها باستخدام الجداول . ووجد تحليل النتائج أن المرضى الذكور (61٪) أكثر من الإناث (39٪)، وكانت الفئة العمرية الأكثر تأثرا في سن 51-70 سنة (36٪).

وتعكس النتائج الرئيسية أن سمك جدار المثانة البولية هي أكثر أمراض المثانة البولية التي تظهر أثناء المسح بالموجات فوق الصوتية، وتكون السماكة المنتشرة أكثر شيوعا من البؤرة، تليها كتلة المثانة 53٪ التي تمثل بأنها (36.2٪) من الكتلة دون التظليل الخلفي، (34٪) كتلة مع التظليل الخلفي (حصاوي)، في حين أن 14 (29.8٪) هي كتلة الكيسيه. (51٪) من حجم المثانة العادي و (49٪) حجم المثانة الكبيرة. والنتيجة هي أن الموجات فوق الصوتية وسيله فعاله في تشخيص أمراض المثانة البولية.

وأوصت الدراسة بأن سمك جدار المثانة البولية هو أهم علامة يجب تقييمها كلما فحص المثانة.

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Chapter One

Introduction

Introduction

1-1Introduction

The urinary bladder is an expandable, muscular container that serves as a reservoir for urine. The bladder is positioned immediately posterior to the pubic symphysis. The urinary bladder is a retroperitoneal organ, since only its superior surface is covered with peritoneum when empty; the urinary bladder exhibits an upside-down pyramidal shape. Filling with urine distends it superiorly until it assumes an oval shape. Ureters enter the posterolateral wall of the urinary bladder through the oblique ureteral openings. Bladder structures can be visualized indirectly by taking x-ray films of the abdomen and by using excretory urography, computed tomographic, magnatic resonance imaging, or ultrasonography which is our interest. (Richard.2007)

Sonography has been valuable method of imaging the body for many years, it's found to be reliable and useful method for differential diagnosis considering bladder abnormalities and other pelvic abnormalities. In addition, it has ability to differentiate between different bladder masses, whether it is solid or cystic masses. Moreover, ultrasound could be use to determine the staging of the urinary bladder tumors. Ultrasonography is a method of a choice for the diagnosis of bladder diseases. Although US imaging is frequently superior to other techniques in depicting certain structures and abnormalities. (catrina et al 2004)

1-2 Problem of study

Disease that affect the size, shape and function of the urinary bladder we discuss that the Sonographic finding in diagnosis these disease in adult Sudanese patients.

1-3 Objectives:

1-3-1 General Objective:

Used Sonographic finding in diagnosis of urinary bladder in adult Sudanese patients.

1-3-2 Specific Objectives:

To evaluate the thickness of bladder wall.

To assess the presence of any mass within the bladder and presence of trabeculation, and diverticula.

To determine the bladder volume.

To use this result in diagnose the disorder

1-5 over view of study:

This study contains five chapters, chapter one introduction. Chapter two literature review and previous studies. Chapter three material and methods. Chapter four the results. Chapter five discussion, conclusion, recommendations, reference and appendix.

Chapter Two

Literature Review

Literature Review

2-1 Anatomy

The urinary system is composed of four organs, kidneys, Ureters, urinary bladder, and urethra. The kidneys filter waste products from the bloodstream and convert the filtrate into urine .The ureters, urinary bladder, and urethra are collectively known as the urinary tract because they transport the urine out of the body. The urinary system is composed of two kidneys, two ureters, a single urinary bladder, and a single urethra. (Michael.2008)

2-1-1 Functions of the urinary system:

Removing waste products from the bloodstream.

Storage of urine: Urine is produced continuously, but it would be quite inconvenient if we were constantly excreting urine. The urinary bladder is an expandable, muscular sac that can store as much as 1 liter of urine.

Excretion of urine: The urethra transports urine from the urinary bladder and expels it outside the body.

Regulation of blood volume: The kidneys control the volume of interstitial fluid and blood under the direction of certain hormones. Also, changes in blood volume affect blood pressure, so the kidneys indirectly affect blood pressure.

Regulation of erythrocyte production: As the kidneys filter the blood, they are also indirectly measuring the oxygen level in the blood. If blood oxygen levels are reduced, cells in the kidney secrete a hormone called erythropoietin.

Erythropoietin acts on stem cells in the bone marrow to increase erythrocyte production. Having more erythrocytes allows the blood to transport more oxygen. (Michael.2008)

2-1-2 Urinary Bladder

The urinary bladder is an expandable, muscular container that serves as a reservoir for urine. The bladder is positioned immediately posterior to the pubic symphysis. In females, the urinary bladder is anteroinferior to the uterus and directly anterior to the vagina; in males, the bladder is anterior to the rectum and superior to the prostate gland. The urinary bladder is a retroperitoneal organ, since only its superior surface is covered with peritoneum when empty; the urinary bladder exhibits an upside-down pyramidal shape. Filling with urine distends it superiorly until it assumes an oval shape. The constricted neck of the bladder is located inferiorly and connected to the urethra. A posteroinferior triangular area of the urinary bladder wall, called the trigone, is formed by imaginary lines connecting the two ureteral openings and the urethral opening. The trigone does not move and remains in place as the urinary bladder fills and evacuates. It functions as a funnel to direct the stored urine into the urethra as the bladder wall contracts. (Michael.2008)

2-1-3**The structure**

The four tunics that form the wall of the bladder are the mucosa, submucosa, muscularis, and adventitia.

The mucosa lines the bladder lumen; it is formed by a transitional epithelium that accommodates the shape changes occurring with distension, and by a highly vascularized lamina propria that supports the mucosa. Additionally, mucosal folds, called rugae, allow for even greater distension. Within the trigone region, the mucosa is smooth, thick, and lacking rugae.

The submucosa lies immediately external to the mucosa and is formed by dense irregular connective tissue that supports the urinary bladder wall.

The muscularis consists of three layers of smooth muscle, collectively called the detrusor muscle. These smooth muscle bundles exhibit such complex

orientations that it is difficult to delineate individual layers in random histologic sections. At the neck of the urinary bladder, an involuntary internal urethral sphincter is formed by the smooth muscle that encircles the urethral opening.

The adventitia is the outer layer of areolar connective tissue of the urinary bladder. A peritoneal membrane covers only the superior surface of the urinary bladder, and in this superior region, the peritoneum plus the connective tissue forms a serosa. (Michael.2008)

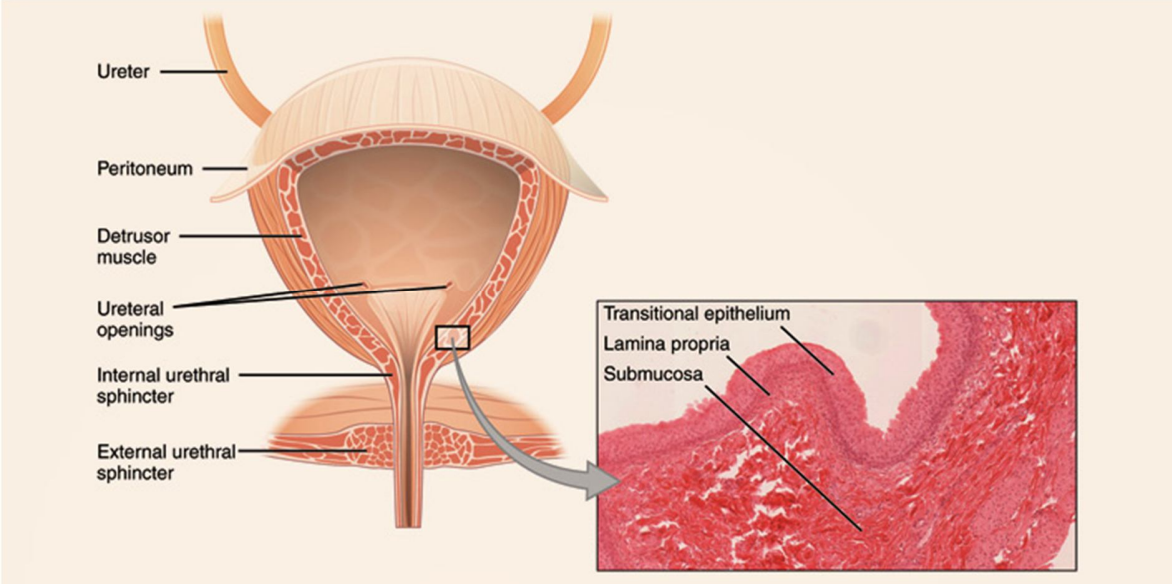

Figure (2-1) Normal urinary bladder anatomy (wikipedia.org)

2-1-4 Blood supply

Blood is supplied from the superior and inferior vesical branches of the internal iliac artery. The vesical veins form a plexus which drains into the internal iliac vein. . (Ellis 2006)

2-1-5 Lymph drainage

Lymphatic's drain alongside the vesical blood vessels to the iliac and then Para-aortic nodes. (Ellis 2006)

2-1-6 Nerve Supply

Efferent parasympathetic fibres from S2 to S4 accompany the vesical arteries to the bladder. They convey motor fibres to the muscles of the bladder wall and inhibitory fibres to its internal sphincter. Sympathetic efferent fibres are said to be inhibitory to the bladder muscles and motor to its sphincter, although they may be mainly vasomotor in function, so that normal filling and emptying of the bladder are probably controlled exclusively by its parasympathetic innervations. The external sphincter is made up of striated muscle. It is also concerned in the control of micturition and is supplied by the pudendal nerve (S2, 3, 4). Sensory fibres from the bladder, which are stimulated by distension, are conveyed in both the sympathetic and parasympathetic nerves, the latter pathway being the more important. (Ellis 2006)

2-2 Micturation

The expulsion of urine from the bladder is called micturation or urination.

Micturation is initiated by a complex sequence of events called the micturation reflex. The bladder is supplied by the pelvic splanchnic nerves relax the internal urethral sphincter so that urine can pass through and stimulate contraction of the detrusor muscle. Thus, the parasympathetic fibers stimulate micturition. The sympathetic fibers are from the T11–L2 segments of the spinal cord. These fibers cause contraction of the internal urethral sphincter and inhibit contraction of the detrusor muscle. Thus, sympathetic fibers inhibit micturition.

The micturition reflex occurs in a series of steps:

When the bladder fills with urine and becomes distended, stretch receptors in the bladder wall are activated, and they signal the micturition reflex center.

Impulses within the parasympathetic division of the autonomic nervous system travel to both the internal urethral sphincter and the detrusor muscle.

The smooth muscle in the internal urethral sphincter relaxes, and the smooth muscle in the detrusor muscle contracts. The person's conscious decision to urinate causes relaxation of the external urethral sphincter. In addition to the squeezing action of the detrusor muscle on the volume of the urinary bladder, the expulsion of urine is facilitated by contraction of muscles in the abdominal wall and expiratory muscles. Upon emptying of the urinary bladder, the detrusor muscle relaxes, and the neurons of the micturition reflex center are inactivated. (Michael. 2008)

2-3Urinary Bladder Pathology

2-3-1Bladder Wall Thickening

The bladder wall is thickened when it exceeds 4 mm in diameter with the bladder distended.

Diffuse wall thickening may be caused by inflammation, muscle hypertrophy or neoplasia.

Focal wall thickening is most commonly caused by inflammation or neoplasia.

2-3-2 Cystitis

The most common cause of cystitis is from the E. coli bacteria which ascend the urethra to enter the urinary bladder. Since females have a shorter urethra and its opening is close to the anus, this type of infection is more common in females. Cystitis may also be caused by radiation and chemotherapy. Any interference with bladder emptying can predispose the bladder to infection. Bladder urine is sterile but stasis of urine is associated with bladder infections. Once bacteria are introduced into the obstructed bladder and the urine is not able to be flushed out or controlled by the bladder wall, the infection gets established. Bladder catheterization is a frequent cause of cystitis. Cystitis may be associated with prostatic disease in adult males. Sonographic Appearances: Acute cystitis is usually associated with a normal bladder wall. Chronic cystitis, when diffuse, is

associated with diffuse wall thickening. Focal forms of chronic cystitis "may produce localized wall thickening or a polypoid mass". The mass may be sonographically similar to an epithelial neoplasm. Intraluminal inflammatory debris is commonly present with chronic cystitis. Chronic cystitis associated with focal wall thickening containing cystic areas of fluid is called bullous cystitis. Bullous cystitis is characteristic of catheter-induced chronic cystitis.

Purulent cystitis is a form of cystitis in which pus is mixed with the urine. Pusurine fluid levels may be demonstrated. The pus flows to the lowest part (ie. The most dependent part). Emphysematous cystitis is the presence of air in the bladder wall or lumen caused by infections from gas forming organisms. Patients with diabetes, chronic bladder outlet obstruction or chronic infections are most vulnerable. The bladder wall is thickened and highly echogenic. If the gas bubbles are large enough, there will be acoustic shadowing.

2-3-3 Neurogenic Bladder

The detrusor muscle of the bladder and the internal and external urethral sphincters are controlled by the brain. Trauma or lesions interfering with the related neurologic control result in a bladder that cannot function properly known as neurogenic bladder. Sonographically**:** Its results in bladder wall thickening, trabeculations (marked irregularity of the luminal surface of the bladder) and incomplete bladder emptying.

2-3-4 Bladder Diverticula

A bladder diverticulum is a pouch-like herniation of the mucosa through a weak area of the muscle wall. Bladder diverticula may be congenital or acquired and they are most often detected in patients with prostatic enlargement and long standing bladder outlet obstruction. Urine collects in these pouches and this often leads to infection. Sonographically, appear as fluid-filled masses projecting from the wall of the bladder. Always try to demonstrate the

connection between the bladder and the diverticulum called the neck. A narrow opening can interfere with emptying of the diverticulum, resulting in urinary stasis and infection. This can change the echogenicity of the urine filling a diverticulum and thereby obscure its true cystic character. Stones, blood, and transitional cell carcinomas can arise within diverticula.

2-3-5 Bladder Calculi

The calculi may originate in the bladder or the kidneys. Bladder calculi characteristically develop in the presence of urine stasis, chronic infection or prolonged use of an indwelling catheter. Calculi are often irritating to the bladder wall and may cause cystitis. They rarely obstruct the bladder neck.

Sonographically, they are highly echogenic focal mobile structures that produce shadows.

2-3-6 Blood Clots

Most patients have gross hematuria. Blood clots appear as moderately echogenic nodules that often adhere to the bladder wall. Fluid-fluid levels caused by the layering of blood and urine are often present. Fixed hemorrhagic masses may be sonographically similar to bladder tumors. Color or power doppler may be helpful to demonstrate the presence of flow and distinguish tumors from clots.

2-3-7 Foley Catheter

The catheter walls are seen as two highly echogenic lines and the balloon has highly echogenic walls with an anechoic interior. The patient may have an incompletely filled bladder resulting in bladder walls that are thick and irregular which is normal for partially filled bladders.

2-3-8 **Bladder Neoplasm**

Transitional cell carcinoma (TCC) of the bladder involves the mucosal lining. It is the most frequent primary malignancy of the bladder (90%). The patient usually presents with painless hematuria. TCC may be papillary or non papillary (smooth). Papillary forms are attached to the mucosa by a stalk, are slow to infiltrate, late to metastasize and generally more benign. Non papillary TCC's are usually solitary, smooth areas of mucosal thickening, and are invasive high grade malignancies. Sonographically, smooth or papillary TCC's appear as hypoechoic soft tissue masses which project into the bladder lumen. Invasive tumors are associated with focal or diffuse wall thickening. Intraluminal blood clots may be present. Dilatation of the ureter and collecting system result from TCC involvement of the ureteral bladder opening.

2-3-9 Bladder Neck Obstruction

Calculi, transitional cell carcinoma, prostatic hypertrophy, prostatic carcinoma, urethral strictures, ectopic ureterocele and posterior urethral valves can obstruct the bladder outlet causing the bladder walls to become diffusely hypertrophied and trabeculated, and if untreated, will result in dilated ureters and bilateral hydronephrosis. A caudal angulation of approximately 15 degrees is necessary to demonstrate the urethra using the transabdominal approach.

2-3-10Posterior Urethral Valves (PUV)

This is a congenital disorder involving the prostatic portion of the urethra. "Incomplete regression of the mesonephric ducts causes exaggerated folds of the posterior urethral mucosa and ultimately various degrees of partial or intermittent obstruction.PUV may be detected prenatally in the fetus, neonate or older infant. Sonographically, typical findings include a trabeculated bladder with an elongated, dilated posterior urethra, which establishes the diagnosis of PUV.

2-3-11 Urachal Anomalies

The urachus is an embryonic canal connecting the urinary bladder to the umbilicus. The urachus regresses by the time bladder formation is complete leaving only a fibrous cord connecting the dome of the diaphragm to the umbilicus. The fibrous cord is known as the median umbilical ligament. It is located in the midline, anterior to the peritoneum and is closely applied to the inner surface of the anterior abdominal wall.

A urachal fistula (patent urachus)**:** occurs when the entire urachus remains open. Sonographically a small tubular structure is shown in the midline against the inner surface of the anterior abdominal wall communicating with the bladder inferiorly and the umbilicus superiorly.

A urachal sinus: occurs when the umbilical end remains patent and the bladder end closes normally. Sonographically a tubular tract is shown extending inferiorly from the umbilicus ending blindly on the midline anterior abdominal wall.

Aurachal diverticulum: develops in the bladder wall when the bladder end remains open and the umbilical end closes normally. Sonographically a closed sac continuous with the bladder lumen is shown extending from the anterior bladder dome to the anterior abdominal wall.

A urachal cyst: develops when both the bladder and umbilical ends close and the remainder is patent. Sonographically an anechoic spherical or tubular cyst is shown in the midline, closely applied to the anterior abdominal wall between the umbilicus and bladder. (Dean .2005)

2-4 Normal Bladder Ultrasonography:

Sonographically, the normal distended bladder appears as a smooth walled, anechoic structure within the pelvis. In the transverse plane, it appears as a squareshaped organ; whereas in sagittal, the urinary bladder appears more

elliptical. The normal empty urinary bladder will have a more evident wall, whereas the bladder that is fully distended will have a thin wall. When the bladder wall is thickened, its diameter will exceed 4 mm in a distended state.8 The wall should be analyzed closely for irregularities. The volume of the bladder can be evaluated sonographically. A bladder volume can be obtained using the following formula: *L*W*H** 0.56.14. Also, patency of the ureters can be proven sonographically by demonstrating ureteral jets with color Doppler in the area of the trigone. (Dean .2005)

2-4-1 Adult Bladder Volume Measurement

Quantification of the overall bladder volume is important in patients who have urinary retention. Attempts to measure the various dimensions of the bladder and then derive volume measurements have met with limited success.

The normal volume may be up to 500 ml without major discomfort.

$$V = (H \times W \times D) \times 0.523\ 24$$

The sagittal image provides the craniocaudal distance (H) and the AP distance (D).The transverse image at its widest dimension provides the width (W) (Dean .2005)

2-5 Background Studies

Mahmoud et al 2012 was studied ultrasound in the incidence of urinary bladder diseases at alkhartoum teaching hospital

The study involved 250 Sudanese patients. included any untreated Sudanese patient who had either least one symptom or more of urinary bladder complains such as dysuria, burning with micturition, frequency of micturition, hematuria, urine incontinence, cloudy or foul smelling, nocturia, lower abdominal or pelvic discomfort, backache, fever, urine retention and urgency. The study was performed using General Electric (GE) medical system, logic-five expert ultrasound machine. The applied ultrasound transducer was 3.5 MHz convex transducer. Before ultrasound scan start, the bladder should be full enough. The result show wide spectrum of clinical symptoms detected in patients with urinary bladder complains; were dysuria presents in (20.4%), (18.4%) hematuria, (17.0%) burning micturition, (9.6%) retention of urine, (8.4%) lower abdominal and pelvic pain, (8.0%) polyuria, (6.8%) urine incontinence, (6.0%) suprapubic discomfort, (2.7%) nocturia, (2.4%) urine urgency, and cloudy urine or foul smelling and fever (0.1%) epending on the sonographic features and characteristics, pathological findings in the untreated urinary bladder of Sudanese subjects included such abnormalities; Cystitis (acute; chronic) was found in (47.6%) of cases, vesicles stone(s) (14.4%), urine retention (12.8%), Schistosoma haematobium (8%), urinary bladder neoplasms (7.2%), urinary bladder tuberculosis (5.2%), urinary bladder diverticulum (1.6%), neurogenic bladder (1.2%), posterior urethral valve (0.8%), urinary bladder clot (0.8%) and urachal anomalies seen in (0.4%) in the scanned cases .

Alhassan et al 2014 was aimed to assess the diagnostic capabilities of transabdominal sonographic findings in the Diagnosis of Urinary Bladder abnormalities, methods and Material used is a cross-sectional study design, was conducted in different hospitals and clinical centers at Khartoum State. A total of 110 patients with symptoms of urinary bladder diseases were included in this study who had been selected and scanned with ultrasound using the appropriate technique. His result was show that the cystitis was the commonest vesical pathology and common in female than male, Hematuria 29.75%, dysuria 25%, and showed that shistosomiasis mainly involve the male. The study concluded that ultrasonography is the first line of investigation as well as laboratory test (urine general) since it is safe, accurate and not time consuming.

Chapter Three

Material and Methods

Material and Method

3-1 Material

3-1-1Study Design:

A descriptive study deals with hundred Sudanese patients with different ages and gender, different sign and symptoms presenting to the ultrasound department. The study was conducted in Sudan at Alobayed city (Wad Alyas medical center), during period from January to April 2017.

3-1-2 Ultrasound unit used:

Used Shimadzu SDU - 2200 (Japan) ultrasound machine with multi-frequency linear probe (8 – 15 MHZ) and convex (2-2.5MHz) which has variable focal zone and frequency capability, Proper setting of the overall gain (system) gain and time gain or depth gain compensation (TGC/ DGC) was adjusted to optimally visualize each organ.

3-2Method

3-2-1 **Ultrasound Technique:**

Preparation of the patient: The bladder must be full, Give 4 or 5 glasses of fluid and examine after one hour (do not allow the patient to micturate)

Patient Position: The patient should lie supine, the patient should be relaxed, lying comfortably and breathing quietly.

Coupling agent: *A* coupling agent is necessary to ensure good acoustic contact between the transducer and the skin and allow total transmission of the sound beam

Scanning Technique: Start with transverse scan from the pubic symphesis up word to umbilicus. Follow with longitudinal scan, moving from one side of the lower abdomen to the other. These scan will usually be sufficient, but it is not always easy to see the position of the lateral and anterior walls of the bladder and the patient may have to be turned 30-45 0 to see an area more clearly .Any area that appears abnormal must be viewed in several projections. After scanning, the patient should empty the bladder and then be rescanned.

3-2-2Data collection:

The data had been collected with clinical data sheet and ultrasound image.

3-2-3 Data analysis:

Data had been analyzed by tables and figures.

3-2-2-3 Data presentation:
For data presentation dummy tables and figures has been used.

Chapter Four

Result

Results

Table (4-1) show frequency distribution of gender for all patients

Gender		Frequency	Percent
Valid	Female	39	39.0
	Male	61	61.0
	Total	100	100.0

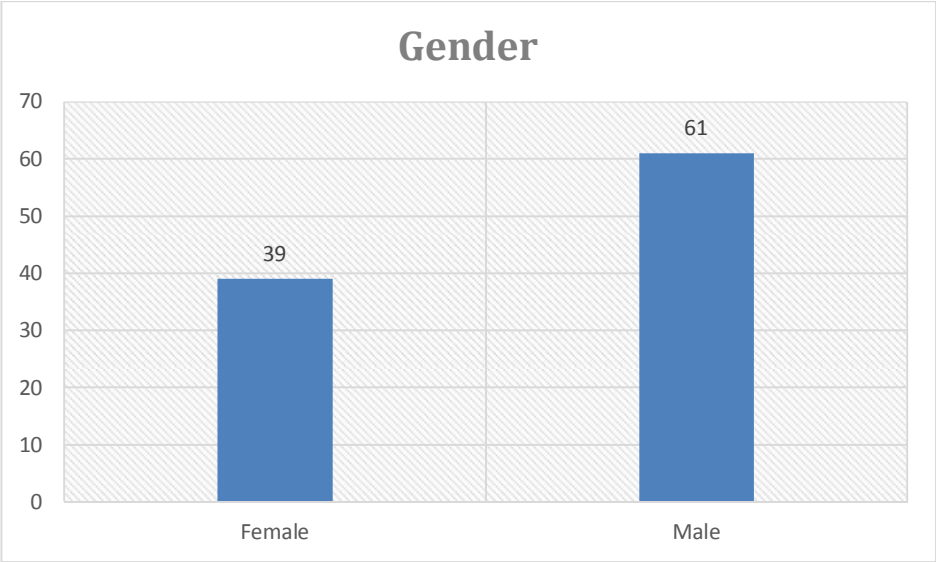

Figure (4-1) shows frequency distribution of gender for all patients

Table (4-2) show frequency distribution of age group for all patients

	Age	Frequency	Percent
Valid	18-30	22	22.0
	31-50	25	25.0
	51-70	36	36.0
	71-90	17	17.0
	Total	100	100.0

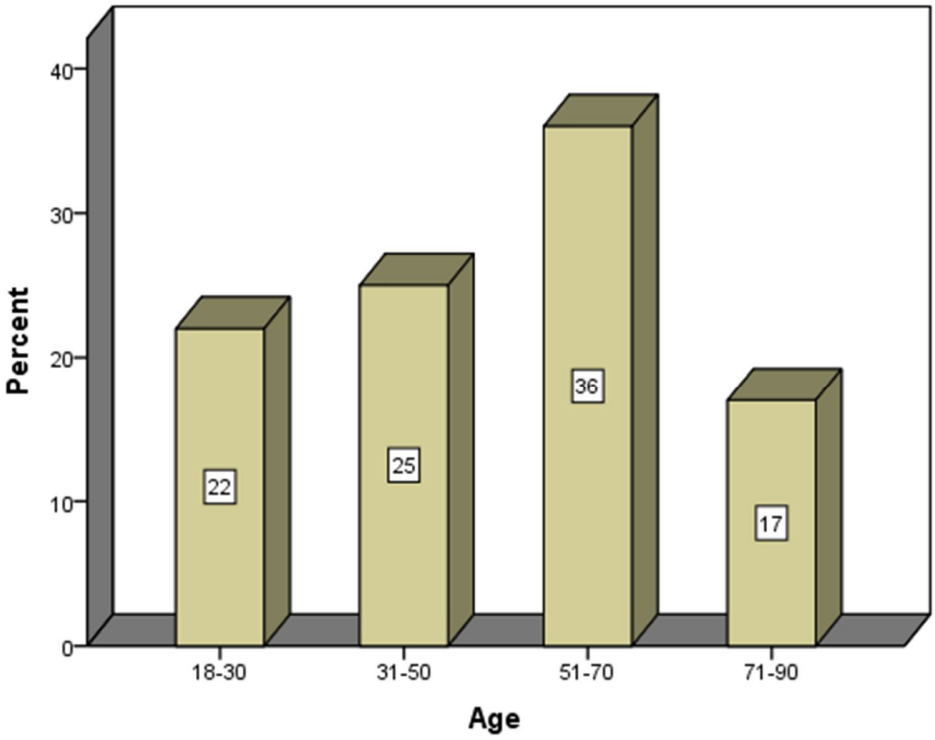

Figure (4-2) shows the percent of age group for all patients

Table (4-3) show frequency distribution of bladder wall thickening

Bladder wall thickening	frequency	percentage
Yes	76	76%
no	24	24%
total	100	100%

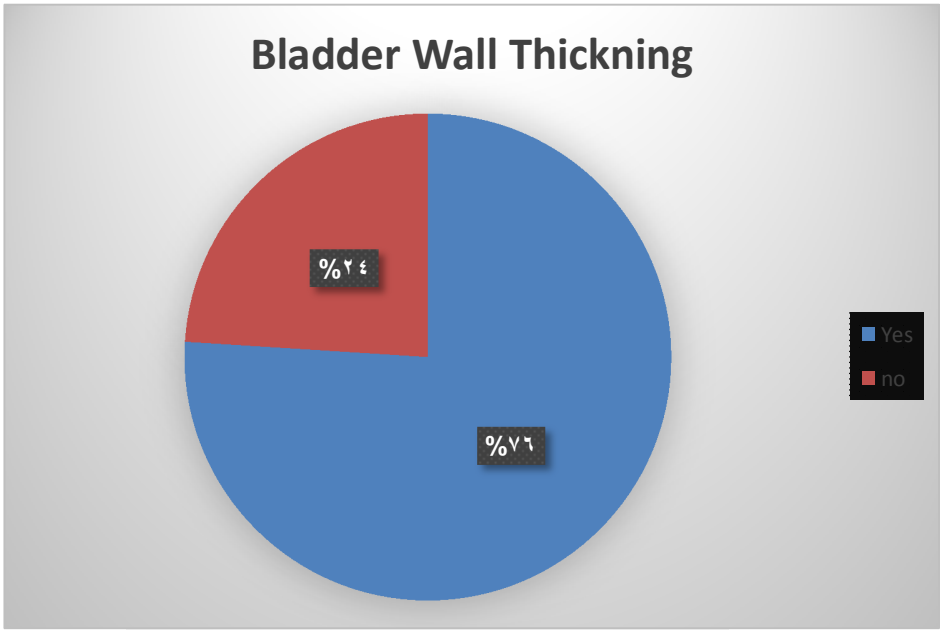

Figure (4-3) shows percentage of bladder wall thickening

Table (4-4) show frequency distribution type of wall thickening

Type	Frequency	percentage
diffuse	54	72.9
focal	20	27.1
total	74	100%

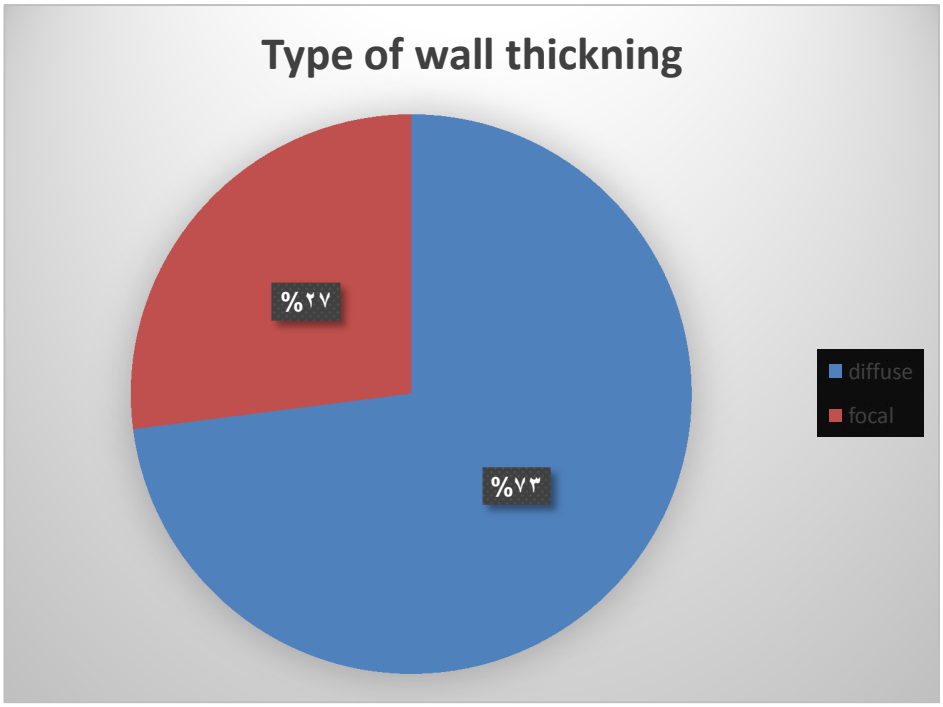

Figure (4-4) shows the percentage of type of wall thickening

Table (4-5) show frequency distribution of the causes of wall thickening

Causes of thick wall	frequency	Percent
Bladder mass	20	25 %
Obstruction cause	15	19 %
infection	38	48 %
unknown	7	8 %

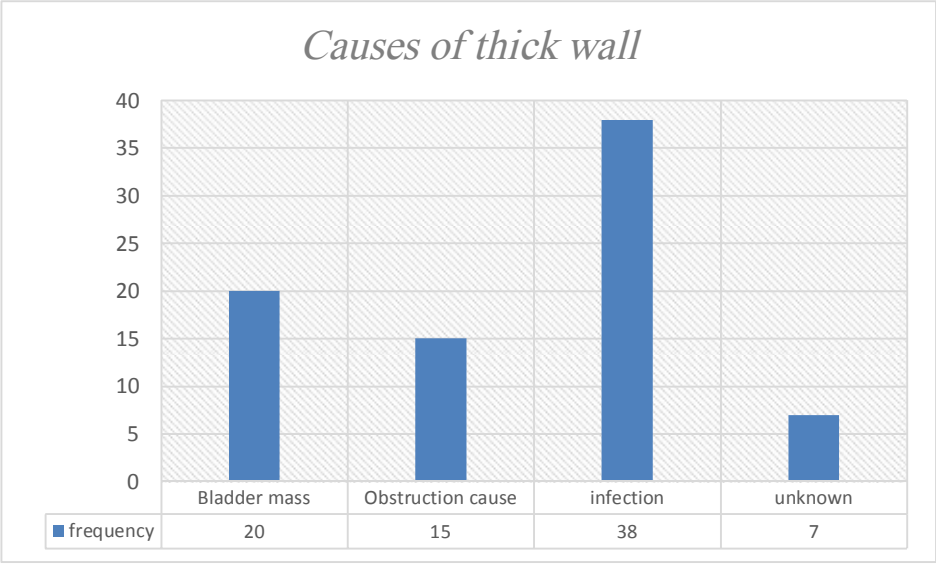

Figure (4-5) shows causes of wall thickening

Table (4-6) show frequency distribution of bladder mass

Bladder mass	Frequency	Percentage
Yes	47	47%
no	53	53%
total	100	100%

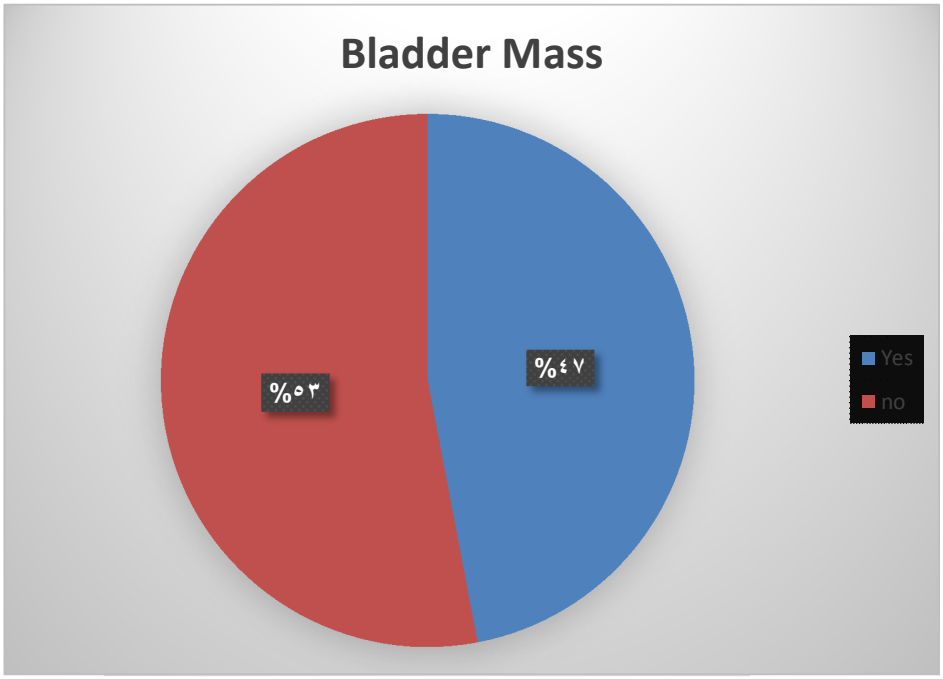

Figure (4-6) show percentage of bladder mass

Table (4-7) show frequency distribution of the type of mass

Type of bladder mass	Frequency	percentage
Solid with shadowing	16	34%
Solid non shadowing	17	36.2
Cystic mass	14	29.8
Total	47	100%

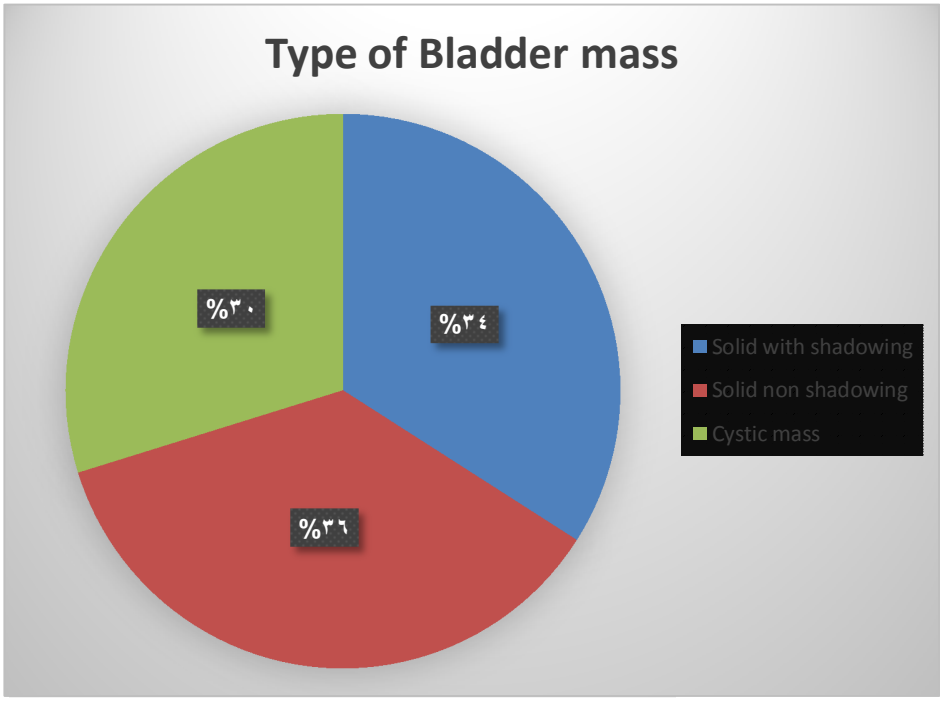

Figure (4-7) show percentage of the type of mass

Table (4-8) show the frequency distribution of bladder volume

Bladder volume	Frequency	percent
Normal	51	51 %
Large	49	49 %
Total	100	100%

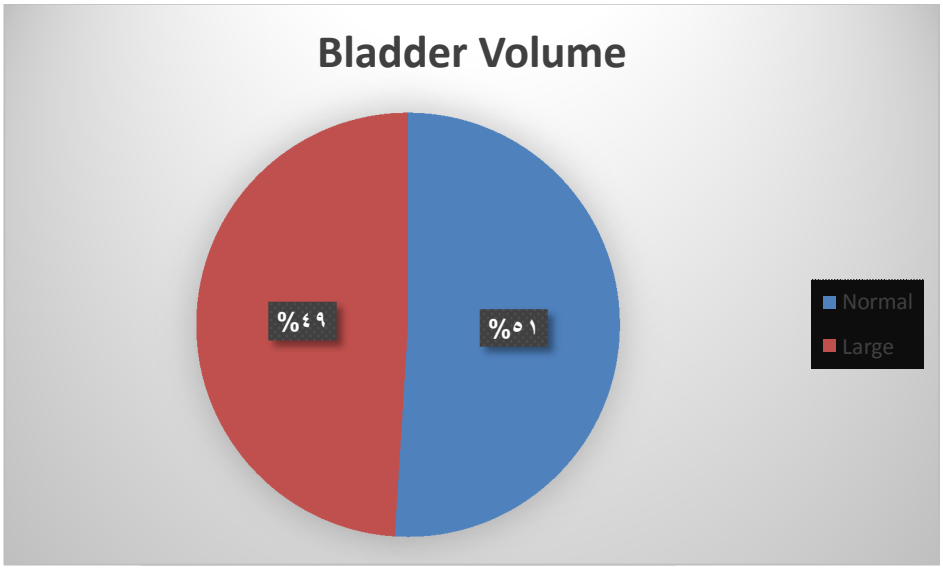

Figure (4-8) show the frequency distribution of bladder volume

Chapter Five

Discussion, Conclusion and Recommendations

5-1 Discussion

A descriptive study aimed to use Sonographic finding in diagnosis of urinary bladder disorders in adult Sudanese patients using transabdominal ultrasound, 100 patients underwent U/S examination of the abdomen and the urinary bladder was evaluated in all patients in sagittal and transverse section, the data were collected from Alobayed city, diagnostic radiology department (U/S section).

Table and figure (4-1) show that 61 of the patient out of 100 61% are male and 39 39% are female. These results disagree with Alhassan et al 2014 was aimed to assess the diagnostic capabilities of transabdominal sonographic findings in the Diagnosis of Urinary Bladder abnormalities.

Table and figure (4-2) show age group for all patients that the most affected age between 51-70 years represent 36%.

Table and figure (4-3) show that 76 out of 100 patients (76%) have bladder wall thickening and 24 (24%) have normal urinary bladder wall.

Table and figure (4-4) (4-5) represent the type and causes of wall thickening either for focal or diffuse and the result was that 54 out of 76 (72.9%) are diffuse thickening while 20 (27.1%) are focal, while the causes distribute as 20 out of 76 (25%) of the cause is the present of mass in the bladder , 15 patient (19 %) obstructive cause , 38patient (48 %) with infection , while 7 patients (8%) with unknown causes. These findings reflect that the urinary bladder wall thickening is most urinary bladder disease that appear during ultrasound scanning and also reflect that the diffuse thickening is the common more than the focal. This is agree with our tow previous studies which show the cystitis is most common pathological finding.

Table and figure (4-6) (4-7) show that 47 out of 100 (47%) patients are with internal bladder mass while 53 (53%) without bladder mass, and 16 (34%) out of 47 are solid mass with posterior shadowing, 17 (36.2%) of mass without posterior shadowing, while 14 (29.8%) are cystic mass. These finding show that bladder mass are detectable by ultrasound either solid or cystic .Bladder calculi is one of most common solid mass that easily detected by ultrasound because its associated with posterior shadowing and bright echoes . But other solid mass blood clot, polyp, tumor may need Doppler ultrasound or laboratory investigation to know the nature of mass. Cystic mass can be differentiated by their position, either bladder diverticula, ureterocele or folly catheter.

Table and figure (4-8) show that from 100 patient's urinary bladder volume after micturation, 51 cases (51%) have normal bladder volume, 49 cases (49%) have large (residual) bladder volume.

These finding reflect the fact that ultrasound play an important role in urinary bladder volume measurements which is very important for detecting many of bladder pathologies.

5-2 **Conclusion**

The study conducted that the ultrasound is an informative imaging technology for assessment of urinary bladder pathology.

Bladder wall thickening is an important sign that reflects many pathologic information's in which it most common bladder pathology.

Bladder volume measurement (Post Voidance Ratio) is an important finding that play major role in assessment of urinary bladder pathology.

5-3 Recommendation

- Bladder ultrasound should be done for all patients complaining of pelvic pain.
- Bladder ultrasound should be done whenever scanning abdomen.
- For unknown nature of bladder mass or unknown cause of bladder wall thickening, there should be further investigations done.
- Ultrasound machine should have a Doppler.
- Bladder volume index should be standardized in every country.

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Appendices

Appendix-A

Image 1 : sonogram of urinary bladder for female patient 56yrs shows bladder divrticulum

Image 2: longitudinal and transverse sonogram of urinary bladder 23 yr male pt shows urinary bladder calculi.

Image 3: longitudinal and transverse sonogram of urinary bladder 65 yr male pt shows urinary bladder calculi

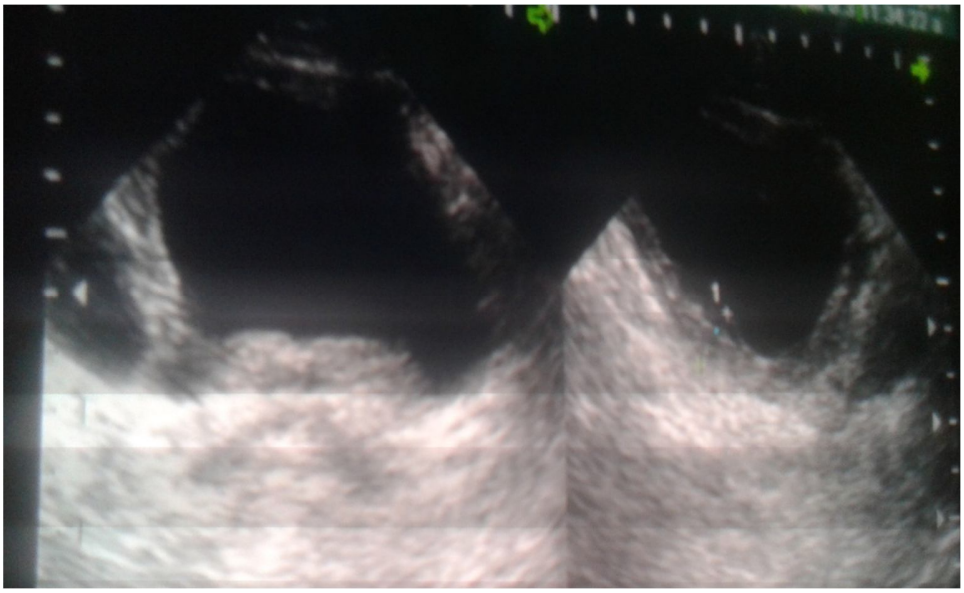

Image 4: longitudinal and transverse sonogram male 22yrs of urinary bladder male shows focal thickening of posterior urinary bladder wall.

Image 5: shows longitudinal and transverse sonogram of urinary bladder 50 yr female shows diffuse thickening of urinary bladder wall.

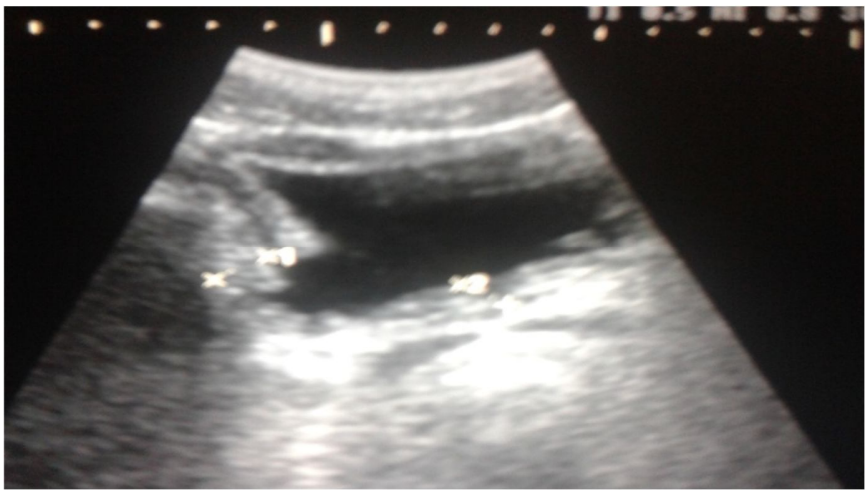

Image 6: sonogram of urinary bladder male 30 yr shows diffuse thickening of urinary bladder wall with irregular border.

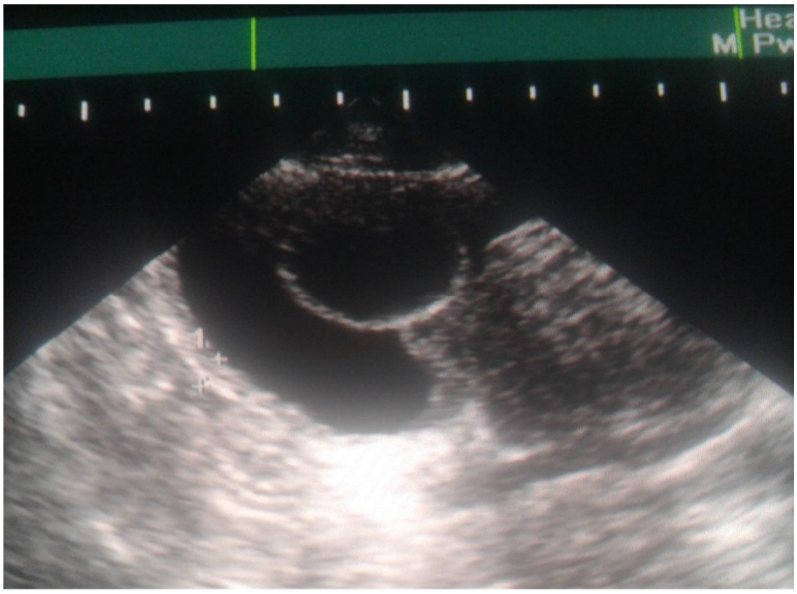

Image 7: longitudinal sonogram of urinary bladder 70 yr male shows Foley catheter

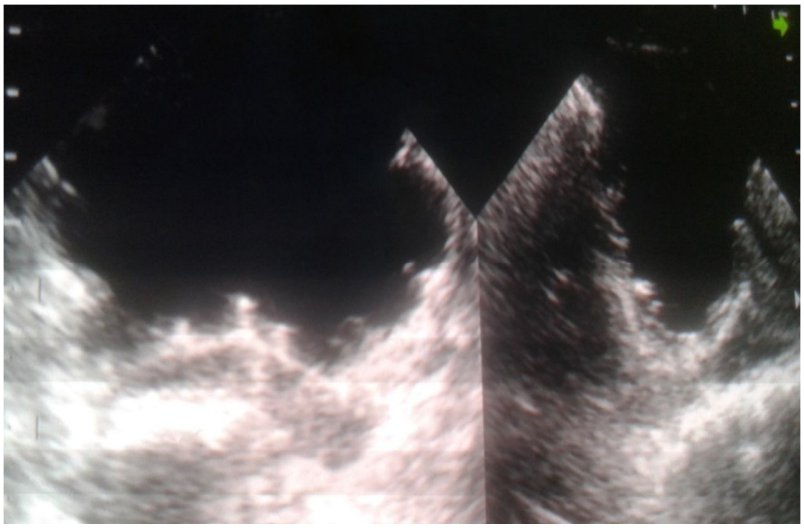

Image 8: longitudinal and transverse sonogram of urinary bladder 68 yr male pt shows diffuse wall thickening wit trabeculation.

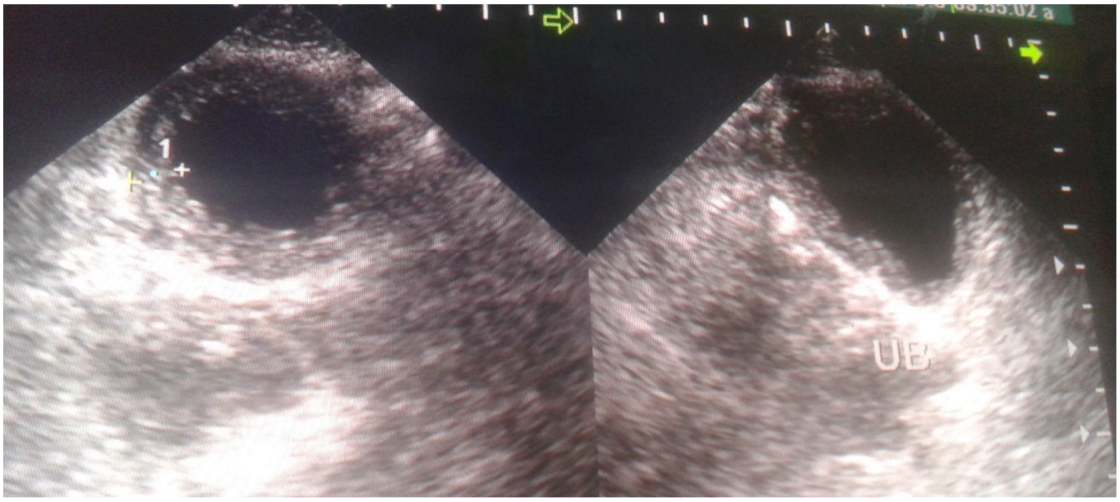

Image 9: shows longitudinal and transverse sonogram of urinary bladder 45 yr male shows diffuse thickening of urinary bladder wall.

Appendix-B

num	Gender	Age	Wall thick		Bladder mass			Bladder volume		
			focal	diffuse	shadowing	Non shadowing	hypoechoic	normal	large	small
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										