Sudan University for Science and Technology

Collage of Graduate Studies

Study of postmenopausal vaginal bleeding Using (T .V. S)TransvaginalSonograghy

دراسة نزيف بعد سن الياس باستخدام الموجات فوق الصوتية المهبلية

Thesis Submitted for Partial Fulfillment of the Requirements of

M.Sc Degree in Medical Diagnostic Ultrasound

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بسم الله الرحمن الرحيم

(ربي أشرح لي صدري ويسر لي أمري واحلل عقدةمنلساني يفقهوا قولي)

صدق الله العظيم

lovingly dedicate this thesis to

my husband

&

my daughter

whom supported me each step of the way

to

Parents

for their help &support

Acknowledgment

First and foremost, I must acknowledge my limitless thanks to ***Allah****, the Ever-Magnificent; the Ever-Thankful, for His help and bless. I am totally sure that this work would have never become truth, without guidance of Allah.*

A deep debt of gratitude to our university for giving us an opportunity to complete this work. I am grateful to some people who worked hard with me from the beginning till the completion of the present research particularly my supervisor ***Dr. Mona Ahmed Mohammed*** *, she has been always generous during all phases of the research, and I highly appreciate the efforts expended by* ***Dr. Ahmed alkhzan****,teamwork&postmenopausal women received by gyncolygistinalkhzan hospital in Sanaa (Yemen) .*

مستخلص البحث

أجرت هذه الدراسة خلال الفترة خلال شهر أكتوبر 2014 وشملت عدد 50 امرأة في مرحلة انقطاع الدورة الشهرية تراوحت أعمارهن بين 45 و 80 سنة وكن يعانين من نزيف مهبلي وحضرن إلى مستشفى الخزان بمدينة صنعاء باليمن.

تم تصويرهن بالموجات فوق الصوتية نسبة لأنه فحص غير مؤذٍ ويمتاز بالدقة العالية وقلة التكلفة.باستخدام مجس 6 ميقاهيرز بغرض اكتشاف سبب النزيف.

وأثبتت النتائج أن هناك 20 من المرضى يعانين من عدم انتظام في سطح الرحم الداخلي وكانت سمك الرحم أكبر 5 ملم أما البقية فلا توجد لديهن مشاكل في سطح الرحم مع وجود نفس السمك (أكبر من 5 ملم).

كان هناك عدد 6 مريضات (12%) سمك جدار الرحم عندهن أقل من 5 ملم مع وجود رحم منتظم ، و 4 مريضات (8%) أقل من 5 ملم مع وجود عدم انتظام في باطن الرحم.

اظهرت الدراسة أيضاً أن هناك 10 مريضات (20%) يعانين من ارتفاع في مستوى الصدى في الورم وأن هناك عدد 29 مريضة (58%) مع انخفاض مستوى الصدى وبالبقية 11 مريضة (22%) ظهرت أورامهن بين الارتفاع والانخفاض (مختلطة).

في 25 مريضة (50%) كان نوع الورم المكتشف سليلة بطانية رحمية وفي 16 مريضة (32%) كان الورم عضلى أملس في عضلة الرحم وفي 4 مريضات (8%) كان الورم عبارة فرط النسيج البطاني للرحم وفي 5 مريضات (10%) كان الورم كتلة كيسية خارج الرحم.

Abstract

This study was conducted during October 2013 and Octobr2014 in 50 women after menopause their t ages range from 45 to 80 years old, they were attended to alkhzan hospital in Sanaa (Yemen) with vaginal bleeding.

Due to non-invasive , increased accuracy and low cost ultrasonic, we are use it for the referred patients to imaging by using Edan ultrasound machine with Transvaginal probe (TVS) 6 MHz to detect the cause of post-menopausal bleeding.

The study found that (40 patients which was 80%) 20 of them had irregular outline of endometrium the thickness more than (> 5mm), the other half was natural endometrium also with thickness (>5mm).

6 patients (12%) had less than 5mm (<5mm) were regular and 4 patients (8%)also less than5mm(<5mm)were irregular endometrium

In this study also found 10 patients (20%) with hyperechogncity of lesion ,then 29 patients (58%) with hypoechogenic and the rest 11patients (22%) mixed echogencity .

25(50%) of the cases the lesion detected is endometrial polyp(tumor) ,but only 16(32%) is myometrialleiomyomas while 4(8%) is endometrial hyperplasia and 5(10%)is extra adnexal mass.

List of Abbreviation

PMB	Postmenopausal bleeding
TVS	Transvaginalsonography
RV	Retroverted uterus
AV	Antiverted uterus
PCO	Polycystic ovary
ET	Endometrium thickness
UT	Uterus
TAS	Transabdominal ultrasound
f	Fibroid
V.B	Vaginal bleeding
US	Ultrasound
EP	Endometrial pathology

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Chapter One

Chapter One

1.1. Introduction:

Menopause is time in a woman's life when her periods (menstruation) eventually stop andthe body goes through changes that no longer allow her to get pregnant. It is a natural event that normally occurs in women age 45 - 55. (MJ Jones – 1996).

During menopause, a woman's ovaries stop making eggs and they produce lessestrogen and progesterone. Changes in these hormones cause menopause symptoms. Periods occur less often and eventually stop. Sometimes this happens suddenly. But most of the time, periods slowly stop over time. Menopause is complete when women have not had a period for 1 year. This is called Postmenopause. Women who are postmenopausal can no longer get pregnant. Surgical menopause is when medical treatments cause a drop in estrogen. This can happen if ovaries are removed or if receive chemotherapy or hormone therapy for breast cancer. (Brunner RL, Aragaki A, Barnabei V, et al)PMB: can be defined as uterine bleeding occurring at least one year after menopause. It is often caused by abnormalities of the endometrium,whether they are benign ormalignant. Accurate and timely diagnosis is important and should preferably be carried out by a safe, simple and minimally invasive method (T*vs*). Guidelines addressing PMB are therefore aimed excluding cervical cancer, endometrial carcinoma or precancerous lesions of the endometrium. *(International Journal of Gynecology & Obstetrics*. 2007)

Ultrasound is non-invasive, inexpensive and repeatable modility and has been used as important and valuable diagnostic tool for detecting cause of postmenopausal bleeding & uterine diseases.(MJ Jones – 1996).

An ultrasound evaluation of the postmenopausal bleeding has been performed by assessing various ultrasound factors such as the endometrium thickness, echogenicity, fiproids, leiomyomas and iliac lymphnodes.Transvaginalsonographycan and should be considered as a first-line approach to this clinical problem because of theextremely high negative predictive value of athin distinct endometrial echo when adequately visualized. Transvaginalsonography has been used as important and valuable diagnostic tools for detecting cause of postmenopausal bleeding & uterine diseases. (Goldstein SR, Nachtigall M, Snyder JR, Nachtigall L.)

1.2. Problem of the study:

Transabdominal (T.A.S) ultrasound cannot help on detecting the cause of postmenopausal bleeding.

1.3. Objectives:

1.3.1. General objectives:

To study post menopausal bleeding using transvaginal ultrasonograghy (T.V.S).

1.3.2. Specific objectives:

1- Tomeasure the endometrial thickness on menopausal bleeding

2-To assess the endometrium outline

3-To determine the cause of postmenopausal bleeding

3-To study the echogencity of lesions that cause the bleeding

1.3.3. Over view 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 is literature review which includes.(Anatomy ,physiology ,pathology and previous study),chapter three about research methodology ,chapter four deal with result and chapter five discussion ,conclusion and recommendation.

Chapter Two

Literature Review

Chapter Two
Literature Review

2.1 Anatomy, physiology& histology:

The female reproductive system includes the ovaries, the uterine tubes, uterus, vagina, and external genitalia. The ovaries perform both an exocrine function by producing ova and an endocrine function by producing estrogen and progesterone.

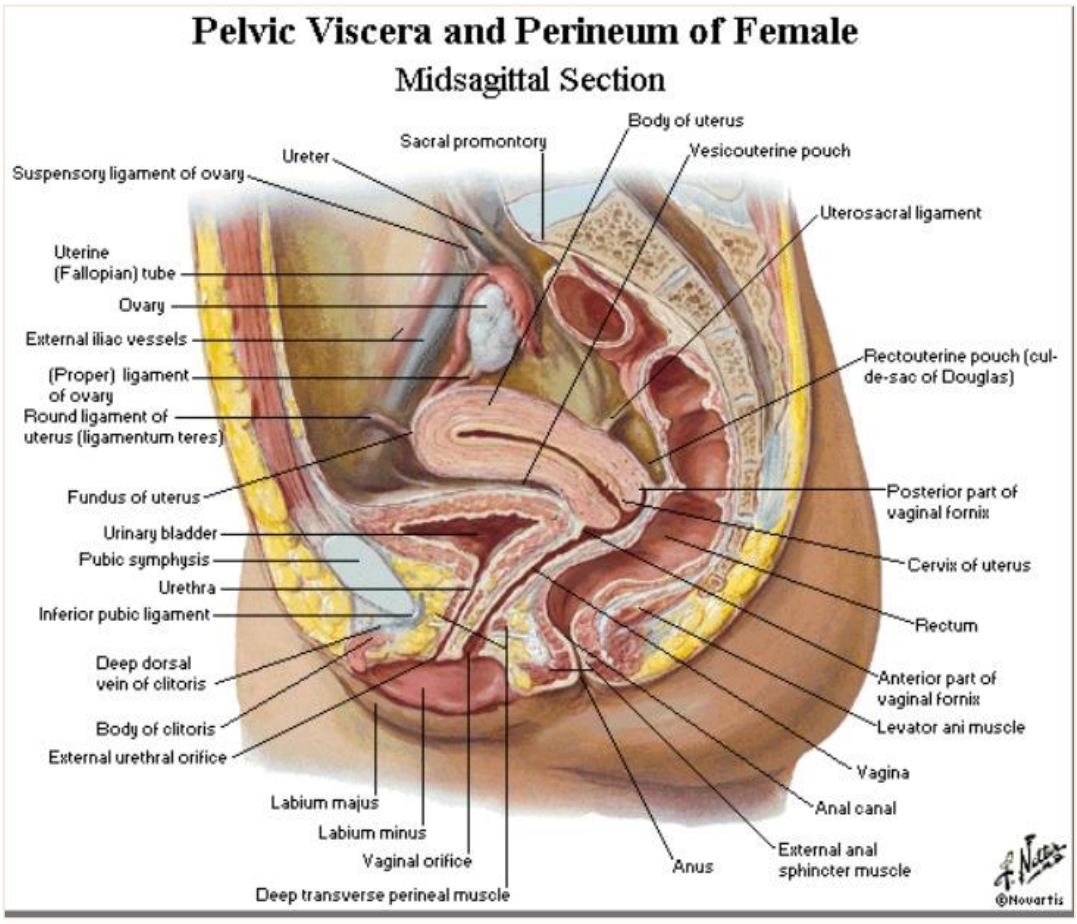


Fig 2.1: Anatomy of female reproductive system (atlas human anatomy of reproductive system)

2.1.1. Uterus:

The uterus lies within the pelvis in relation to the bladder anteriorly and the rectum posteriorly and is a hollow pear-shaped organ that opens into the vagina. The uterus is composed of a mucosa, given the special name of endometrium; a muscularis termed the myometrium; and a serosa, or perimetrium. The uterine mucosa undergoes cyclic changes, which are synchronized with ovarian secretory activity. The surface epithelium is simple columnar with patches of ciliated columnar cells. Uterine glands, lined with a similar columnar epithelium, open to the surface and secrete mucus. The endometrial stroma has a framework consisting of reticular fibers and stromal cells. Lymphocytes and granular leucocytes are also found in the stroma. (Brunner RL, Aragaki A, Barnabei V, et al)

2.1.2. Endometrium:

Is composed of two parts, the superficial functionalis, which undergoes changes during the menstrual cycle and is shed during menstruation, and the basalis, which does not undergo cyclic changes and remains intact during menstruation.

2.1.3. Myometrium:

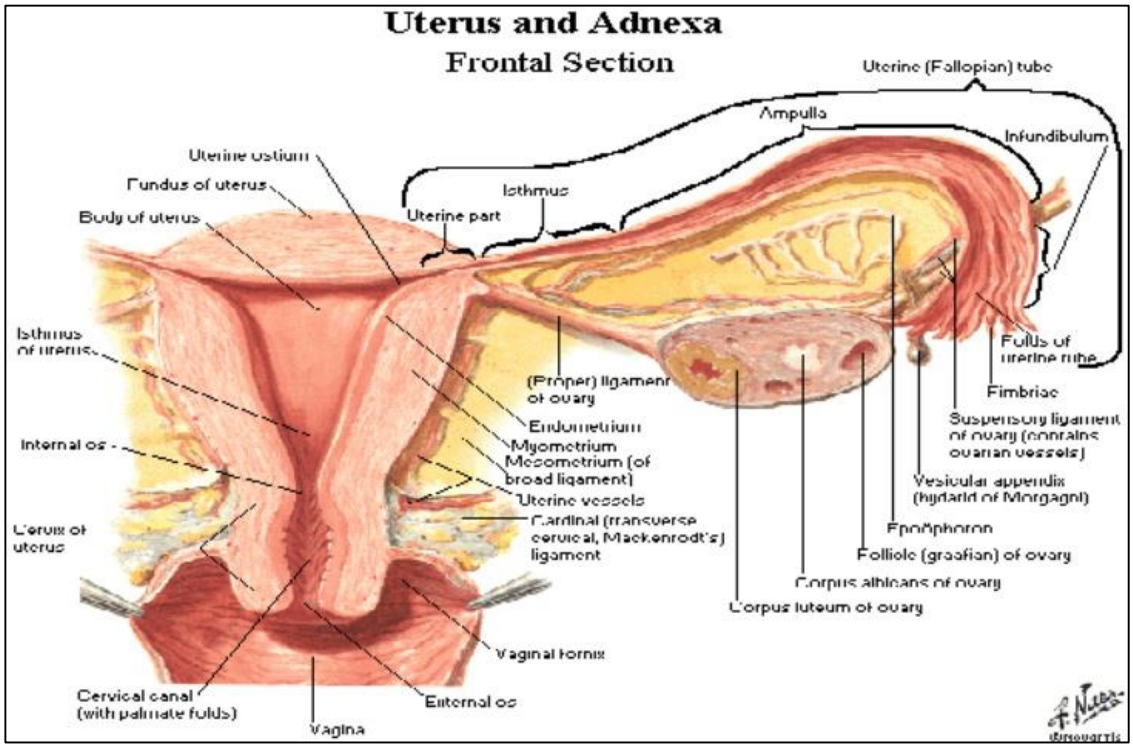
Is a thick coat containing smooth muscle and abundant connective tissues. The smooth muscle of the uterus, in response to female sex hormones, undergoes cyclic variation in length and diameter and in functional activity. Three layers of smooth muscle are recognized: an inner longitudinal layer, a middle circular and oblique layer, and an outer longitudinal layer.

The following cyclic changes occur in the uterine **endometrium** during an idealized 28-day menstrual cycle:

(1) The proliferative or estrogenic phase extends from about day 4 to day 14 of the cycle. This period involves re-epithelialization of the denuded endometrial surface and growth in thickness of the endometrium and glands. The glands are initially straight but begin to coil toward the end of this phase. Estrogen is the dominant hormonal influence during this phase.

(2) The secretory, progestational, or luteal phase constitutes days 15 to 28 of the cycle. During this period, the uterine glands become highly coiled and, irregularly sacculated in the middle of the endometrium. The glandular epithelium secretes a mucoid fluid rich in glycogen. The endometrium becomes edematous and may reach a thickness of 5 mm. Progesterone is the dominant hormonal influence during this phase. On day 27 or 28, the uterus enters the ischemic phase, during which the arterial supply constricts intermittently. At this point, glandular secretion is interrupted.

(3) The menstrual phase involves the extravasation of blood and the detachment of patches of hemorrhagic endometrium until the entire functionalis is sloughed. The basal layer remains intact during this phase and is the source of the regeneratingfunctional layer during the ensuing proliferative phase. The menstrual phase lasts from days 1 to 4 or 5.



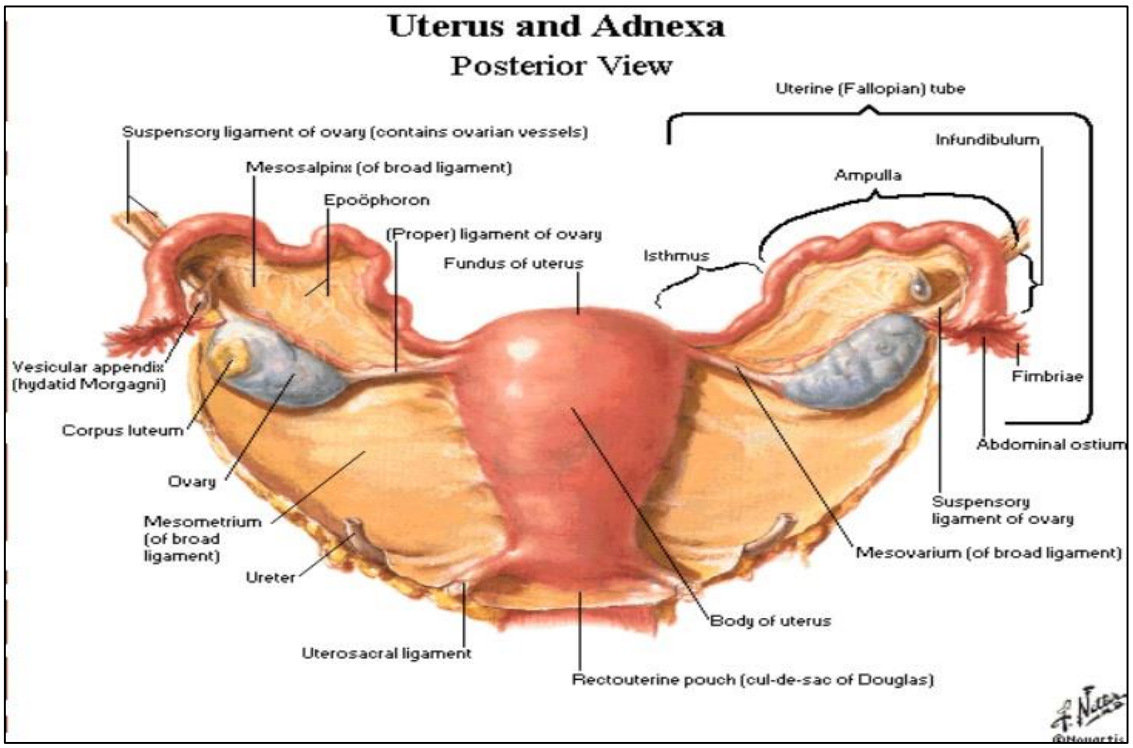


Figure2.1.3 Anatomy oftheuterus (from human anatomy&phyiology)

2.1.4. The Ovaries:

Are ovoid structures, approximately 3 cm in length, lying on each side of the uterus within the pelvis. The ovary consists of a cortical zone composed of a specialized stroma, which contains follicles with ova. In the mature functional ovary, many follicles are quiescent, whereas others exhibit a wide range of histomorphology, depending upon their stage of maturation or regression. The medulla consists primarily of connective tissue and an extremely rich vascular supply.(Brunner RL, Aragaki A, Barnabei V, et al).

Immature ova or oocytes are spherical cells, about 30 µm in diameter; when fully mature, they have increased in size to about 120 µm and are designated ova. The nucleus of an oocyte is large and vesicular and contains aprominent nucleolus. The cytoplasm is rich in nutritive material,the yolk.During human fetal development, the primordial germ cells migrate to and are incorporated within the developing ovary and are termed *oogonia*. Theoogonia multiply by mitosis, but early in fetal life, they enter meiosis. However, the meiotic events are arrested by amechanism not understood in prophase (diplotene stage) of the first meiotic division. These cells, about 40 µm in diameter and termed *primary oocytes*, are enclosed within a single layer of squamous cells, forming a primordial follicle. The primordial follicles in each human fetal ovary number more than 200,000 and decline in number until very few or none remain at about the 50th year. The transition from an inactive primordial follicle to a growing and maturing primary follicle involves changes in the oocyte, the follicular cells, and the adjacent connective tissue. As the oocyte enlarges, the single layer of follicular cells increases in size through mitotic division and gives rise to cell (granulosa cells) that eventually form a stratified epithelium termed the *granulosa*. A distinctive feature of the

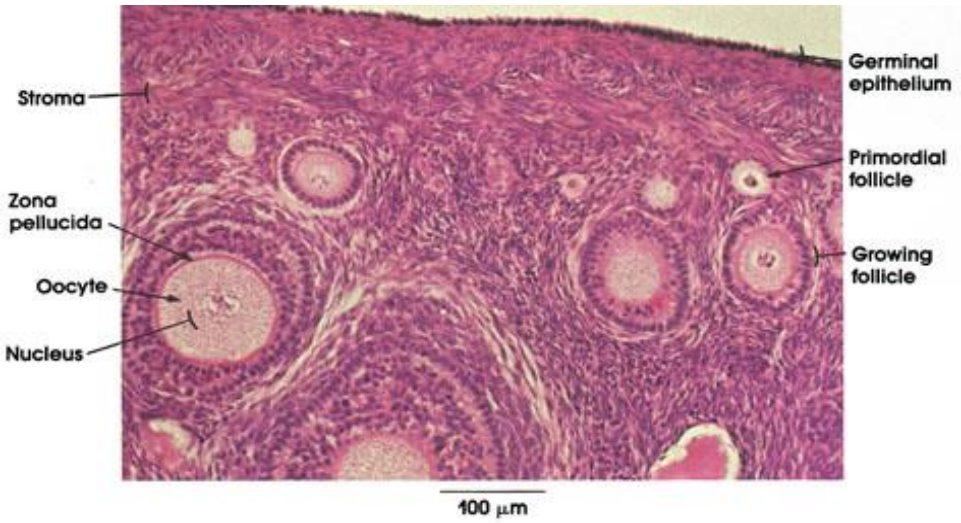
multilaminar follicle is the elaboration of a highly refractilezonapellucida interposed between the oocyte and granulosa cells; the zona is secreted by both the egg and surrounding follicular cells. Concomitant with the development of the granulosa cells, a sheath of stromal cells (theca folliculi) develops around the follicle and subsequently forms two layers. The inner layer exhibits a well-developed capillary plexus and secretory cells and is termed the *theca interna*.

The cells of the theca interna are believed to secrete androstenedione, which is subsequently converted to estradiol by the granulosa cells. Secondary follicles can be identified when they are about 0.2 mm in diameter and are recognized by the presence of irregular spaces among the granulosa cells filled with a clear liquid (liquor folliculi), which increases with continued growth of the follicle. Eventually, the oocyte comes to be eccentrically placed within the follicle upon a pedestal of follicular cells, the cumulus oophorus.

The oocyte is intimately surrounded by a crown of follicular cells, the corona radiata. The cumulus projects into a single large fluid-filled space, the antrum, formed from the coalescence of the smaller spaces noted previously. Even after the primary oocyte has reached full size, the follicle may continue to enlarge until it reaches approximately 10 mm in diameter. Follicles that have matured to maximal size, exhibit a large antrum, and extend through the entire thickness of the cortex are termed *graafian follicles**. Just prior to ovulation, a bulge on the surface of the ovary (the stigma) marks the site where ovulation will occur. The growth of a primordial follicle to full maturity takes about 10 to 14 days. The thecae folliculi, particularly the theca interna, reach their highest development in relation to the mature follicle. (Brunner RL, Aragaki A, Barnabei V, et al).

At mid-menstrual cycle (approximately day 14), the surge of pituitary luteinizing hormone (LH) induces ovulation. At this time, the primary oocyte's first meiotic divisionoccurs, resulting in the formation of the first polar body and the secondary oocyte. In thehuman female, the secondary oocyte completes its second meiotic division at the time of fertilization, and the male and female haploid genomes fuse in the formation of the zygote.Following ovulation and discharge of the liquor folliculi and the oocyte within its cumulus mass, the walls of the follicle collapse and the granulosa cell lining becomes folded. Rupture of blood vessels in the theca interna is associated with bleeding into the partially collapsed follicle, and a clot is formed. The cells of the granulosa layer and the theca interna undergo transformation and are renamed *granulosa lutein* and *theca luteincells*,respectively. These changes in the follicle following ovulation result in a new but transitory organ, the corpus luteum (yellow body, for its appearance in fresh specimens). The corpus luteum secretes the hormone progesterone. If the ovulated oocyte fails to be fertilized, the corpus luteum remains functional for only about 14 days and then regresses and is reduced eventually to a scar within the ovary termed the *corpus albicans* (white body). In the event of fertilization, the corpus luteurn enlarges and persists as a functional endocrine gland throughout most of the pregnancy but begins to involute after the sixth month. Its ultimate fate after the termination of pregnancy is to become a large corpus albicans.Most follicles never develop into mature follicles, since that number is limited to about 400 (or 1 of every 1000 follicles) during the reproductive span of the human female. The process by which follicles degenerate and disappear is little understood and is termed *follicular atresia*. This process can begin at any stage of follicular development. Thesmallest follicles leave no trace of their dissolution, but the larger follicles may leave a remnant of the zonapellucida

as a persistent marker within the ovary. In largersecondary follicles, the earliest signs of atresia include the loosening and shedding of the granulosa cells, the invasion of the granulosa layers by vascular tissue and wandering cells, and the collapse or partial collapse of the follicle.At the time of ovulation, the oocyte is shed upon the surface of the ovary, from which it must be transported to the interior of the ovarian (fallopian) tube. The oviduct possessesa highly specialized, flared terminal portion, the infundibulum, which bears long, frond-like extensions ofthe mucosa (termed *fimbriae*), which sweep over the surface of the ovary; the ovulated oocyte within its cumulus mass is transported by means of ciliaryaction along the surface of the fimbriae toward the ostium, or opening of the oviduct The ostium leads to the second portion of the oviduct, the ampulla, which is the duct's dilated mid-portion where fertilization usually occurs. A constricted isthmic portion joins the ampulla to the uterinewall; the length of the oviduct that passes through the wall of the uterus is termed the*intramural portion* of the organ. The epithelium lining the oviduct is principally simple columnar; many of the lining cells are ciliated. Transport of the cumulus and oocyte within the oviduct is facilitated through vigorous peristaltic action of the oviduct; the muscularis is composed of two layers of smooth muscle, which become progressively more well developed as the uterine tube approaches the uterus. (Ron-El R, Nachum H, Golan A, et al. Binovular human ovarian follicles associated with in



vitrofertilization: incidence and outcome. FertilSteril)1990;54:869–72.

Figure2.1.4: Atlas ofMicroscopic Anatomy of ovary

.Binovular human ovarian follicles associated with in vitrofertilization: incidence and outcome. FertilSteril)1990;54:869–72.

2.1.5. The Vagina:

The outlet of the uterus is the vagina, a fibromuscular sheath lined with thick stratified squamous epithelium. The underlying lamina propria is also thick and contains numerous lymphocytes and other wandering cells that invade the epithelium. The muscularis is irregularly arranged in two layers: an inner circular or spiral layer and an outer longitudinal layer. The vagina does not possess a muscularis mucosae or glands in the lamina propria. The adventitia is a dense collagenous tissue that merges with the adventitia of the bladder and rectum and is highly vascular.(Brunner RL, Aragaki A, Barnabei V, et al)

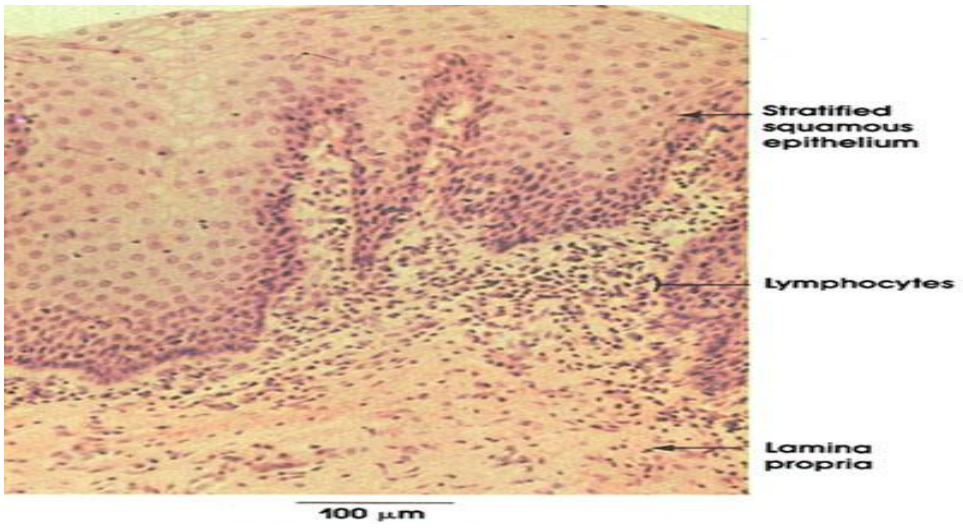


Figure2.1.5:Atlas of Microscopic Anatomy

(Atlas microscopic anatomy of vagina)

2.1.6. Fallopian tubes:

Are attached to the upper part of the uterus and serve as tunnels for the ova to travel from the ovaries to the uterus. Conception, the fertilization of an egg by a sperm, normally occurs in the fallopian tubes. The fertilized egg then moves to the uterus, where it implants to grow into an embryo.

(Ronald A. Bergman, Ph.D., Adel K. Afifi, M.D., Paul M. Heidger, Jr., Ph.D.)

2.1.7. Embryology:

At 3 weeks: undifferentiated Primordial gonadal cells (PGC) are seen in the epithelium of the yolk sac)At 4 weeks: PGC migrate by from the yolk sac to thegenital ridges and proliferate by mitosisPGC induce the genital ridge to differentiate into a primitive germinal epithelium, and become embedded in it, forming primary sex cords. The gonads are then histologically

distinct, bipotent that may become testis or ovary.At 8 weeks: ovary and testis are histologically distinct.

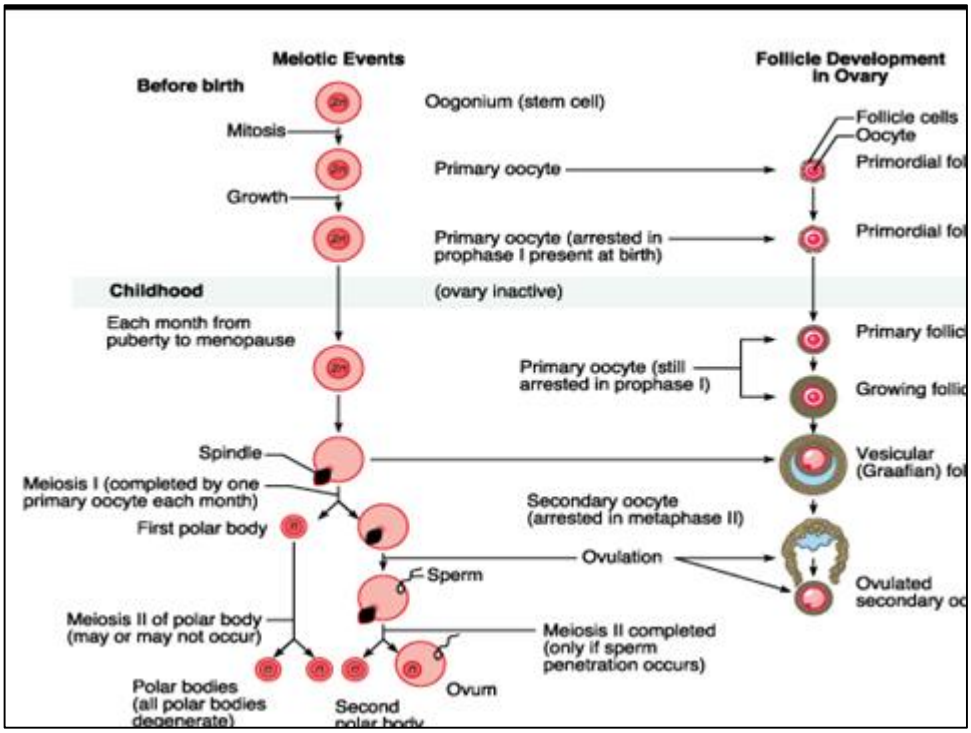
In male: geneproducts directed by activation of the SRY gene cause the undifferentiated sex cords enlarge, split and begin to form the primitive testis. PGC begin to differentiate into spermatogonia.

In female: PGC begin to differentiate into oogonia within follicles.(Sagata et al.1988,1989)

2.1.8. Oogenesis is:

The process of meiosis in female from an oogonium to a primary oocyte,to a secondaryoocyte, and then to an ovum. Oogenesis begins soon after fertilization, as **primordial** cells travel from the yolk sac to the gonads, where they begin to proliferate mitotically. The germ cells multiply from a few thousand to almost 7 million. They become oocytes once they enter the stages of meiosis after birth. Now called primordialfollicles, they are made up of oogeniccellsfrom the primordial germ cells surrounded by follicle cells from the somatic line.The oocyte is then arrested in the first meiotic prophase until puberty.Oogenesis is the process of meiosis in female from an oogonium to a primary oocyte,to a secondary oocyte, and then to an ovum. Oogenesis begins soon after fertilization, as primordial cells travel from the yolk sac to the gonads, where they begin to proliferate mitotically. The germ cells multiply from a few thousand to almost 7 million. They become oocytes once they enter the stages of meiosis after birth. Now called primordial follicles, they are made up of oogenic cells from the primordial germ cells surrounded

by follicle cells from the somatic line.Theoocyte is then arrested in the first meiotic prophase until puberty. (Sagata et al.1988,1989).



From (human embryology)

2.2. Blood supply

2.2.1. Uterine Artery:

The uterine artery is a branch from the anterior division of the internal iliac artery. The artery penetrates the anterior or posterior wall of the uterus itself. At the level of the internal os, the arteries course at right angles to the long axis of the uterus. Below the internalos, the arteries are inclined downward; above this level the inclination is upward. The terminal branch of

the uterine artery is the intramural branch, also described as the arcuate artery. The arcuate arteries lie between the outer and the middle third of the uterine wall, either anterior or posterior. The arcuate arteries terminate in medial peripheral and radialbranches. Free anastomoses between the arcuate arteries on either side of the uterus can be seen. The blood supply of the tube and the ovary is derived from both the uterine and the ovarian arteries. In general, the uterine supplies the medial half of the ovary and the medial two thirds of the tube, whereas the remainder of the blood supply arises from the ovarian artery. The ovarian artery alone may supply the entire tube and the ovary.(Pelage et al.).

The uterine artery crosses above the ureter, and there is a ureteric branch. It anastomoses with the vaginal arteries, forming the azygos artery of the vagina. The cervicovaginalbranch arises directly from the uterine artery in 91% of cases, whereas in 9% its origin is directly from the internal iliac artery. The origin of the uterine artery is extremely variable.(Pelage et al.).Uterine Artery Supplies:

Ureter,Vagina, Uterus,Broad ligament of uterus,Round ligament of uterus

Uterine tube and part of the ovary.The tortuous terminal branches in the uterus are called helicine arteries.(Pelage et al.).

2.2.2. Uterine Plexuses:

The uterine venous plexus extends laterally in the broad ligaments, communicating with the ovarian and vaginal plexuses. The uterine plexus is drained by the uterine vein, which is a tributary of the internal iliac vein.

2.2.3. Ovarian Artery:

Knowledge of the ovarian artery anatomy is important for the success of certain procedures of embolization on pelvic organs such as in uterine fibroids. An important implication of the ovarian artery-to-uterine artery communications is the possibility of ovarian failure and premature menopause after uterine artery embolization. (Dr Donna D`Souza Dr HenaryKnipe et al.)

2.2.4. Vaginal Artery:

The vaginal artery may be two or three arteries and corresponds to the inferior vesical artery in males.(Dr Grace Florescu et al.).

2.2.5. Vaginal Plexuses:

The vaginal plexuses connect with the uterine, vesical, and rectal plexuses and are drained by vaginal veins to the internal iliac veins.Supplies :Vagina ,Vesical and fundusRectum .(Dr Grace Florescu et al.)

2.3. How to Perform Transvaginal Ultrasound(TVS):

The transducer is coated with u/s gel and then covered with a protective sheath. Air bubbles should be eliminated to avoid artifacts. An external lubricant is then applied to the outside of the protective covering. The transducer then inserted into the vagina with the pt. supine, knees gently flexed and hips elevated slightly on a pillow. With gentle rotation and angulation of

the transducer, both sagittal and coronal images can obtained. Slight anterior angulation of the transducer will bring the fundus of an anteverted uterus into view. To visualize the cervix the transducer must be pulled slightly outward. Mild angulation may be needed to visualize the entire adnexa and cul- de- sac. The tip of the transducer can be used to evaluate for areas of focal tenderness.

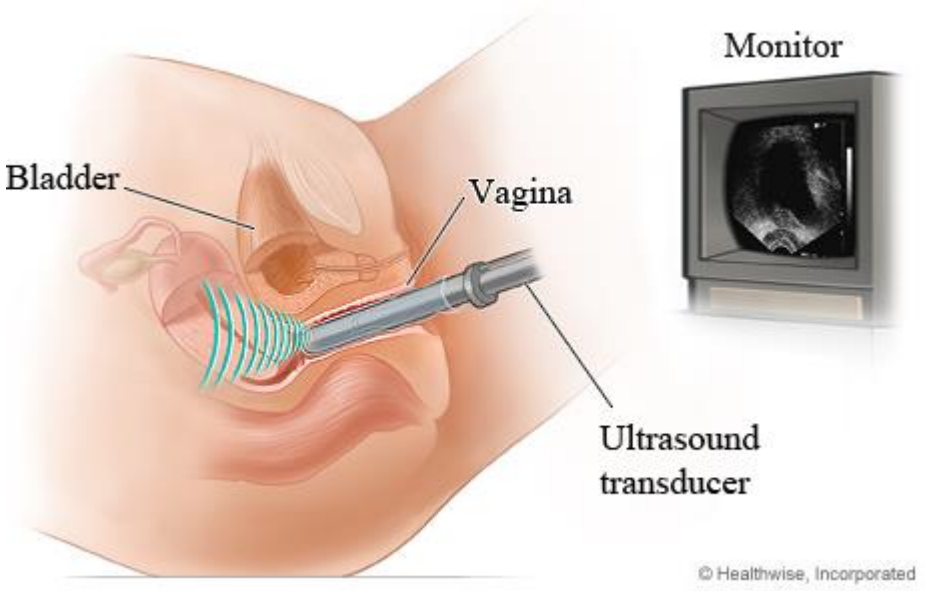


Figure2.4.8: Transvaginal Ultrasound
From (medical reviewerdSchaff,MD Diagnostic Radiology) .

2.4. Normal Ultrasound Appearances

2.4.1. Uterus:

The position and relationship of the female pelvicorgans vary considerably with posture and result of interactions with the surrounding viscera The central location and large size of the uterus inthe pelvis allow it to be used as a landmark for orientation.However, the position and flexion of theuterus itself can vary. In transvaginalsonography,with the image oriented so that the probe is positionedat the lowest point on the screen, an

anteverteduterus projects from the anterior vaginalfornix to the right of the screen towards thebladder and anterior abdominal wall (Fig. 2.5.1.A).Conversely, a retroverted uterus projects from theposterior vaginal fornix and extends to the left ofthe screen away from the bladder(Fig. 2.5.1B). Theposition of the body of the uterus in relation to thecervix, which is anchored in the midline, can alsovary and a uterus might be anteflexed (angledforward) or retroflexed (angled backward) in relationto the cervix. A uterus that is axial lies in the same axis as the vagina and cervix; the ultrasoundbeam in this case is no longer perpendicular to the endometrium and consequently image quality might be less satisfactory.(Dr Owen Kang and Dr Matt A.Morgan et al).

The uterus is a pear-shaped, muscular, hollow organ situated in the true pelvis. It is found in the midline of the pelvis, anterior to the rectum and posterior to the urinary bladder. The appearance of the uterus varies depending on the age of the woman and the stage of the menstrual cycle at which she is scanned. The uterus is divided intofour anatomic parts – fundus, corpus, isthmus and cervix. The fundus is the dome-shaped uppermost aspect of the uterus, the lateral-most part of the fundus extends into the interstitial part of each fallopian tube. The corpus extends from the fundus down to the cervix, the junction of the corpus and cervix is the isthmus, which is the site of development of the lower uterine segment in pregnancy. The wall of the uterus is composed of three layers: parametrium, myometrium and endometrium.Theparametrium is a thin layer of peritoneum that is highly echogenic on ultrasound and gives the uterus a bright outline. The myometrium is the muscular layer of the uterus, which is normally homogenous and echodense. The endometrium, the inner most layer of the uterus, varies greatly inresponse to the prevailing hormonal influence and

timing within the menstrual cycle. The size and shape of the uterus vary greatly in relation to parity and age.

The bulk of the uterus consists of myometrium, which is the smooth muscle substance of the uterus and is continuous with the cervix. As the organ is predominantly made of one tissue type, its appearance is homogenous with a fine echodense texture. The thickness of the uterine walls is variable with age, parity and the presence of pathology. The area of myometrium closest to the endometrium is known as the junctional zone, and this might be less echogenic and is not always visible. The outer layers of the myometrium can be punctuated by small cystic spaces, which represent the arcuate vessels in cross-section, the flow within these vessels is classically slow and, with age, they might sclerose and calcify giving a hyperechoic appearance. Various uterine developmental anomalies can be recognized on ultrasound, the most common being the subseptate uterus and the bicornuate uterus. The subseptate uterus will have a uniform and smooth external uterine contour. The bicornuate uterus is distinguished by the presence of a deep fundal indentation that divides the uterus into two distinct bodies with one unified cervix and isthmus

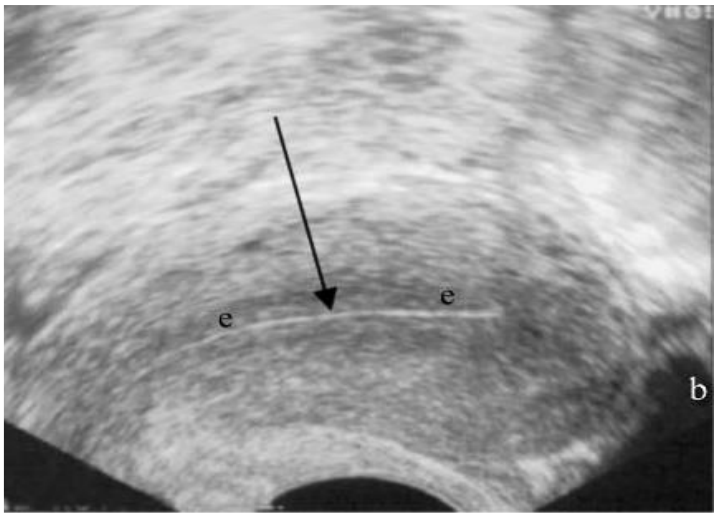
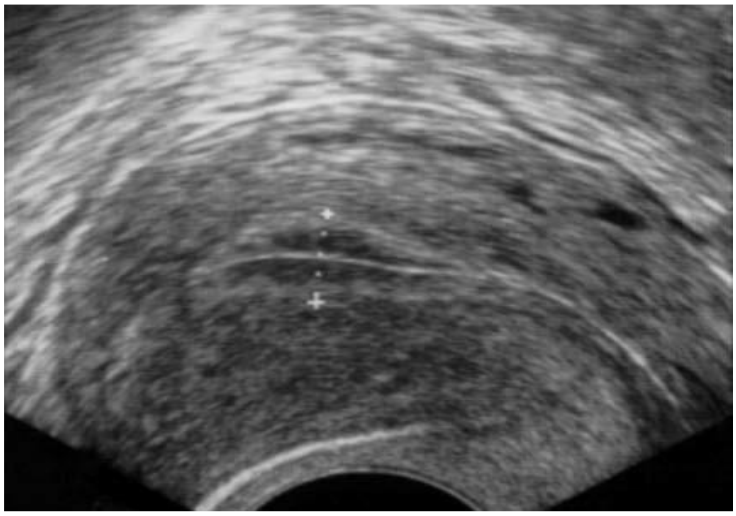


Fig. 2.5.1.AAn anteverted uterus in the earlyproliferative phase. The midline echo is clearly visible as an echogenic line (arrow) surrounded by a thin layer ofhypoechoic endometrium (e). The bladder is visible to theright of the uterine fundus, on the extreme right of theimage.*Am J ObstetGynecol 2009*



(Fig. 2.5.1B)Measurement of the endometrium ina retroverted uterus in the late proliferative phase.The endometrium should be measured from thesuperior to the inferior endometrial/myometrialborder encompassing both leaves of the endometrium,as indicated (□□□□□□□). The midline echo should beat 90□□to the sound beam to enable accuratemeasurement.*Am J ObstetGynecol 2009.*

2.4.2. Endometrium:

The endometrium is a specialized form of mucousmembrane that is responsive to circulating hormonesand a variety of drugs. The appearance ofthe endometrium is therefore highly variable, depending on the timing of the menstrual cycle and the effect of any drugs. Measurement of the thickness of the endometrium conventionally includes both layers. This is because it is generally easier to visualize the junctional zone between endometrium and myometrium than it is to visualize the interface between the anterior and posterior layers of endometrium.In the absence of significant endometrial pathology, such as a polyp, the entire thickness of the endometrium appears uniform. The thickness and appearance vary with the timing of the cycle; a range of 5–14 mm is consideredto be normal in women of reproductive age.In the proliferative phase of the menstrual cycle, the functional layer becomes responsive to the increasing levels of estrogen. This causes the proliferation, lengthening and increase in tortuosity ofthe endometrial glands. The thickness of theendometrium is in direct relation to follicular development and rising estrogen levels. As the proliferativephase progresses, the endometrium notonly thickens but also becomes less echogenic;however, the myometrial–endometrial interfaceand the interface between the opposing two layersof endometrium becomes more echogenic and theclassic three-stripe endometrial echo is observed.Toward the end of the proliferative phase, withcontinued exposure to high levels of circulatingestrogens, the entire endometrial complex becomes increasingly echogenic as a result of glycogen accumulation and edema. After ovulation and the formation of the corpus luteum, increasing levels of progesterone cause a halt in endometrial proliferation. The endometrial glands, under the influence of progesterone, begin to secrete glycoproteins. The distinctive proliferative endometrium appears uniformly

echogenic on ultrasound examination. If there is no pregnancy, the endometrium will not continue to grow, although it remains secretory. With the fallinglevels of estrogens and progesterone toward the end of the cycle, the functional layers begin to disintegrate and menstruation ensues. The endometrial appearance at this time is variable but it remains echogenic.(Karlsson B, Granberg S, Wikland M, et al.).

Inpostmenopausal women who are not onhormone replacement therapy (HRT), the normalendometrium appears homogenous and echo-poor compared with the adjacent myometrium. Anendometrial thickness of 4 mm or less is considered normal .(Karlsson B, Granberg S, Wikland M, et al.).

2.4.3. Fallopian tubes:

The fallopian tubes extend within the broad ligament from either cornu of the uterus to their fimbrial ends, which are usually located superior to the ovaries. The tube is made up of four parts: the interstitial portion, the isthmus, the ampulla and the infundibulum. The interstitial portion is located within the body of the uterus and can be clearly seen as a hyperechoic line extending from the lateral uterine angle to the origin of the broad ligament (Fig 2.5.3); the isthmus and ampulla are rarely seen without the use of contrast media. The infundibulum can beseen if it is floating in peritoneal fluid (Fig.2.5.3).

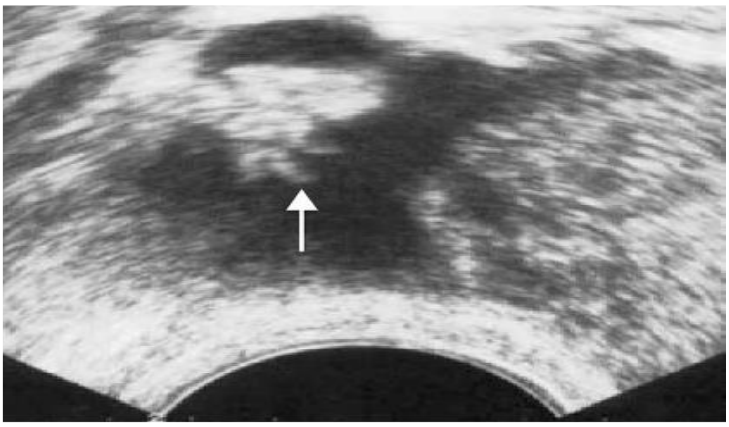


Fig.2.5.3 A view of the fimbrial end (infundibulum) ofthe tube (arrow) surrounded by free fluid in the pouch of DouglasGoldstein. The role of TV U/S or endometrial biopsy in the evaluation of the menopausal endometrium. (Am J Obstetric Gynecol 2009.)

2.4.4. Ovaries:

The ovaries are usually located in the ovarian fossa, inferior to the pelvic vessels on the lateral pelvicwall. However, they are mobile structures and can be found in the pouch of Douglas or above theuterine fundus; they can be located by following the broad ligament laterally. They appear as ellipsoid structures, which are slightly hypoechoic in comparison with the myometrium (Fig2.5.4).

Ovarian folliclesare simple, anechoic cysts with clear and well-defined walls. They grow at an averagerate of 2 mm/day until they reach 20–25 mm in diameter, just before ovulation. Strictly speaking, the diagnosis of an ovarian follicle can only be made on a follow-up scan that demonstrates normal follicular growth or signs of ovulation. However, in practical terms every simple ovarian cyst measuringless than 25 mm in size in a premenopausal woman can be classified as a follicle. Doppler examination of the follicles reveals only limited vascularity. Corpora luteacan be solid, cystic

or hemorrhagic. Solid corpora luteaare sometimes difficult to differentiate from the surrounding ovarian tissue and can be identified only by their high vascularityCystic corpora lutea can contain either anechoic fluid or low level echoes. In comparison to follicles, their walls are thicker and often irregular. A hemorrhagic corpus luteumisrecognized by the typical honeycomb appearance of its contents. The characteristic blood flow of a corpus luteum is halo-like and of high velocity and low resistance.

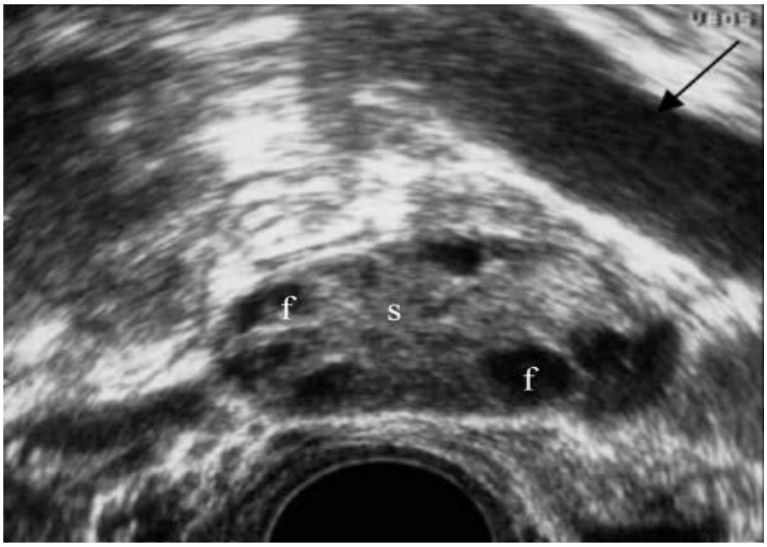


Fig2.5.4 The left ovary seen medial to the left iliacvessels (arrow) using the transvaginal approach. A fewsmall follicles (f) are seen in the cortex. The ovarianstroma (s), which occupies the central section of theovary, appears moderately echogenic.

2.5. Pathology: Uterine abnormalities:

2.5.1. Uterine fibroids:

These are the most common gynecological tumor being present in 50% of women over 40 years of age. Fibroids are composed of smooth muscle fibers and fibrous connective tissue, which is arranged in concentric rings.

Fibroids that lie within the myometrium without distorting the serosalsurfaceor endometrial cavity are termed *intramural*.Those fibroids that distort the uterine cavity are *submucous*(Fig. 2.6.1) and a fibroid that distorts the serosal surface is called *subserous*. A large proportion of fibroids can be in more than one ofthese positions. Fibroids can also be *pedunculated*and submucosal, these fibroids will distort theendometrial cavity and might, if on a long stalk,prolapse though the cervix. (Exacoustos C, Romanini M, Amadio A, Amoroso C, SzabolB, Zupi E, et al.)

On ultrasound,fibroids might be single or multiple,and cause focal or generalized enlargement ofthe uterus. The outer contour of the uterus might be irregular because of the presence of focal subserousfibroids and the endometrial cavity might be distorted by the presence of submucous fibroids. The myometrium is highly variable inechodensity depending on the size and position of the fibroid; the appearance of the myometrium is also affected by reflection and reduced transmissionof ultrasound through a fibroid. This produces characteristic acoustic shadowing. There might also be areas of calcification, cystic degeneration and fluid levels within the fibroid.There might be areas of high velocity blood flow within the fibroid ,especially

if the fibroidislarge. (Exacoustos C, Romanini M, Amadio A, Amoroso C, SzabolB, Zupi E, et al.)

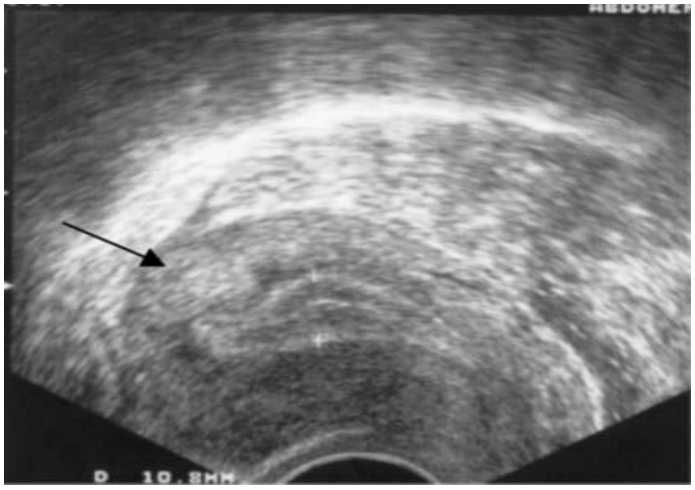


Fig. 2.6.1 A asmall submucous fibroid indenting theuterine cavity in a retroverted uterus. The endometrium(□□□□□□□) is in the late proliferative phase with a clearmidline echo, which is distorted by the fibroid (arrow).

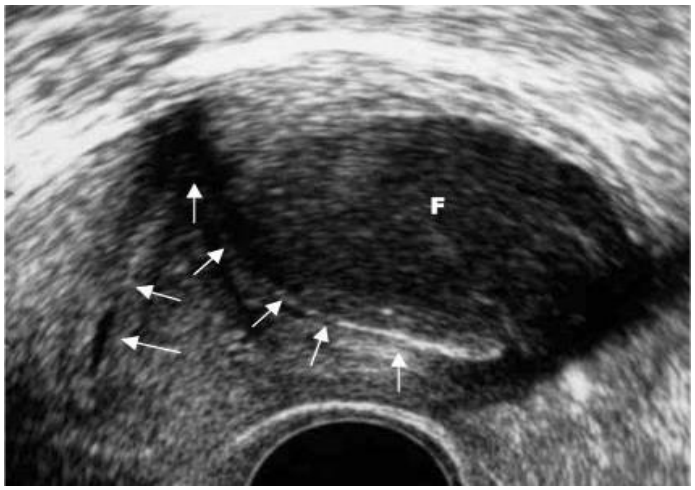


Fig.2.6.1 .B A large submucous fibroid (F) significantly distorting the uterine cavity (arrows). The fibroid is hypoechoic in relation to the surrounding myometrium.

2.5.2. Endometrial polyps:

Endometrial polyps are a common finding inwomen of 35 to 50 years with abnormal vaginalbleeding on ultrasound, endometrial polyps appear as distinct hyperechoic areas within the endometrium (Fig.2.6.2).(Salim S, Won H, Nesbitt-Hawes E, Campbell N, Abbott J.Diagnosis and management of endometrial polyps).

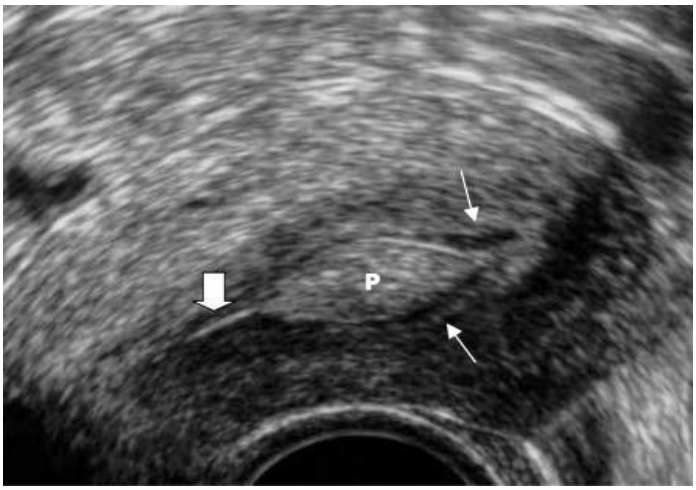


Fig.2.6.2 An endometrial polyp. Note thehyperechoic polyp (P) disrupting the midline echo (thickarrow) and the endometrium (thin arrows) around thepolyp(Salim S, Won H, Nesbitt-Hawes E, Campbell N, Abbott J.Diagnosis and management of endometrial polyps).

2.5.3. Adenomyosis:

This is a relatively common condition that affects women of reproductive age and is considered to be a variant of endometriosis. Adenomyosis typically presents in women who are in the latter part of their reproductive years and multiparous. The classic presenting symptoms are dysmenorrhea and menorrhagia.The disease is more common in women who have had previous uterine surgery, most commonly dilatation and curettage and cesarean section. On clinical examination, the uterus might be enlarged, especially on the posterior uterine wall, where adenomyosis is usually more extensive.

The ultrasound diagnosis of adenomyosisin most cases, the uterus appears normal or enlarged, and the posterior uterine wall might appear thickened. The myometrium can appear heterogenous with areas of both hyperechogenicity and hypoechogenicity representing areas of small myometrial cysts. These cysts contain the remnants of menstrual flow from the ectopic endometrium .An adenomyoma is a focal, localized area of endometriosis and might be distinguishable as a focal echo-poor mass (Fig.2.6.3).

However, the appearances can be very similar to a uterine fibroid, which might be a coexistent pathology.(Atri M, Reinhold C, Mehio AR, Chapman WB Bret PM.) Radiology 2000;215:783-90.

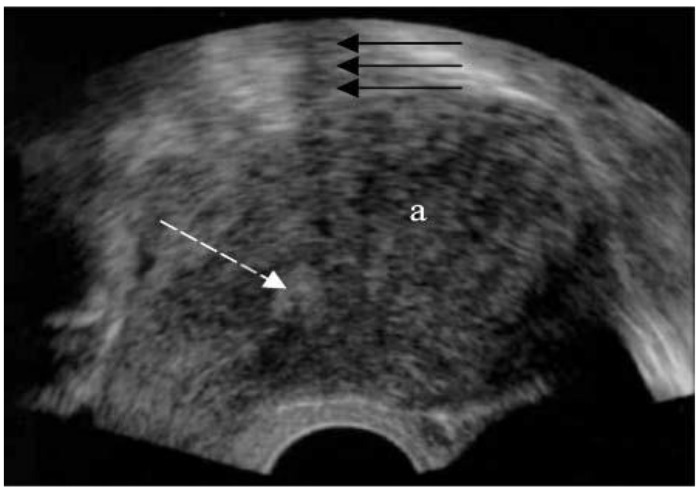


Fig.2.6.3 A large adenomyoma (a) seen at thefundus of the uterus casting an acoustic shadow(arrows). It is slightly distorting the endometrial cavity(broken arrow).

2.5.4. Endometrial hyperplasia:

Endometrial hyperplasia results from the prolonged action of estrogens that are unopposed byprogesterone. Thus, it is more common to find this condition in women who have high circulating levels of estrogen, such as in women with polycystic ovaries, obesity, estrogen-producing tumors(e.g. granulosa cell tumor of the ovary) and women who are taking exogenous estrogens (e.g.hormone replacement therapy (HRT) and tamoxifentherapy). The significance of endometrial hyperplasia lies not only in the symptomology but also because it is considered to a precursor of endometrial carcinoma.The ultrasound appearance of endometrialhyperplasia is characteristic. The endometrium is usually thickened (>10 mm) and demonstrates increased echogenicity with occasional small cystic areas (Fig.2.6.4). Small hyperechoic areas representing endometrial polyps might also be present.The three distinct forms of endometrial hyperplasia(cystic, adenomatous and atypical) are indistinguishable on ultrasound.

The final diagnosis of endometrial hyperplasia ismade histologically. Therefore, in the presence of a history that is suggestive, together with suspiciousultrasound findings, endometrial sampling must be carried out.

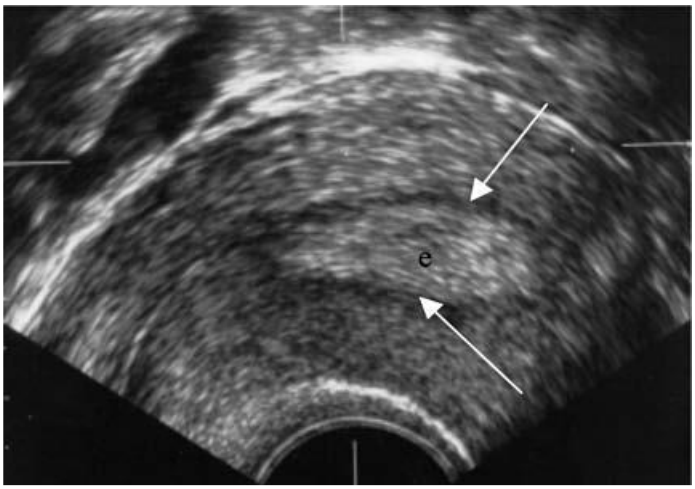


Fig.2.6.4 Cystic endometrial hyperplasia. Theendometrium (e) is thick and hyperechoic in relation tothe surrounding endometrium. It is irregular and cystic inappearance but a clear hypoechoic line demarcates themyometrial border (arrows). Goldstein SR. ObstetGynecol 1994;83:738-40

2.6. Ovarian abnormalities:

2.6.1. Polycystic ovaries:

The polycystic ovarian syndrome was described by Stein and Leventhal in 1905A and is a triad ofclinical symptoms, abnormal hormone profile and polycystic appearance of the ovaries on ultrasound polycystic ovary is defined as an ovary that contains 10 or more cysts measuring 2–8 mm in diameter with an increase in ovarian stroma (Fig.2.7.1).(Balen A H, Conway A S, Kaltsas G et al 1995 Polycystic ovary syndrome)

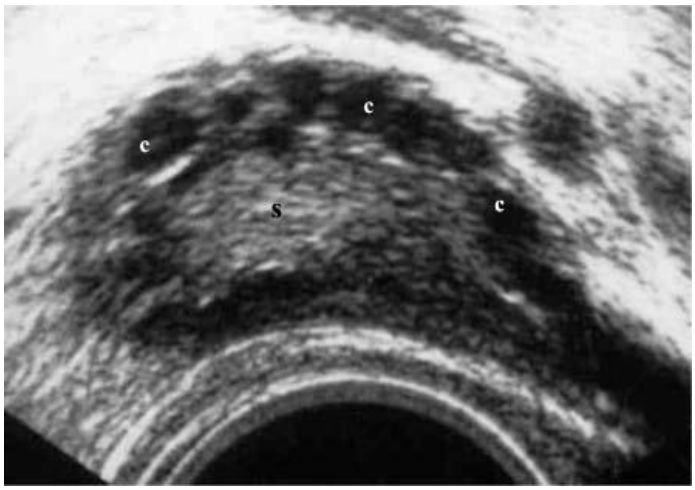


Fig.2.7.1 Polycystic ovary demonstrating thenumerous small cysts (c) arranged peripherally and thetypical increased volume of echogenic stroma (s).(Balen A H, Conway A S, Kaltsas G et al 1995 Polycystic ovary syndrome)

2.6.2. Multifollicular ovary:

A multifollicular ovary is enlarged and contains six or more follicles of varying size arranged throughout the stroma of the ovary. This is in contrast to polycystic ovaries, in which the follicles arearrangedcentrapetally and are less than 9 mm in diameter. No increase in stromal volume is seen.

2.6.3. Luteinized UnrupturedFollicle:

This appears as a simple anechoic cyst witha thick vascular wall, and might reach a diameter of30mm.

2.6.4. Functional Cysts:

These cysts appear similar to a follicle but are larger in size, and can occasionally reach more than 100 mm in diameter.

2.6.5. DermoidCysts:

These cysts can have cystic and solid areas and are usually poorly vascularized. They are characteristically located laterally in the ovary and are surrounded by a rim of normal ovarian tissue.They typically display mixed echogenicity and might include areas of calcification, due to bone or teeth, which cast acoustic shadows(Fig.2.7.5). Hair inside the cyst can be recognized by the presence of spiculations.(Valentin L 1999 Grayscale imaging and Doppler in pelvic masses. Ultrasound in Obstetrics and Gynecology)

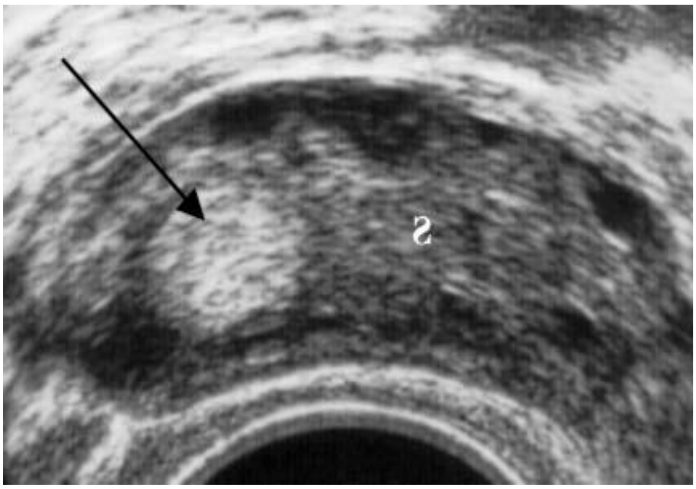


Fig.2.7.5 A dermoid cyst (arrow) lying laterally inthe ovary surrounded by healthy ovarian tissue. The cystappears hyperechoic in relation to the surroundingovarianstroma.

2.6.6. Endometrioma:

Endometriomata are usually located centrallywithin the ovary and are surrounded by normalovarian tissue. The ovaries might be‘kissing’ in the pouch of Douglas (Fig.2.7.6) oradherent to the uterus or pelvic sidewall. Thesemasses are usually unilocular, have regular internalwalls and contain echogenic fluid of a ground glassappearance. This fluid can be induced to move by gentle pressure on the cyst with the probe. Bloodflow can be detected in approximately two-thirds of Endometriomata.

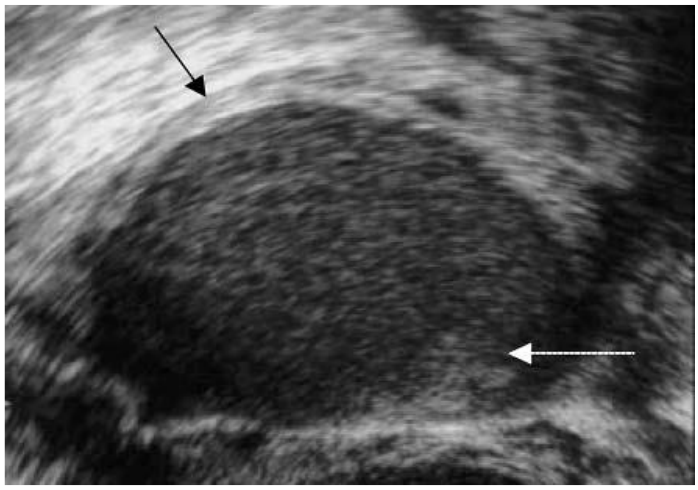


Fig.2.7.6 An endometrioma: a unilocularcystcontaining echogenic fluid of ‘ground glass’ appearancewith a condensation of material inferiorly (broken arrow).The cyst is located centrally and is surrounded by healthyovarian tissue (arrow).

2.7. Previous study:

Several studies have established that the ET generally does not exceed 4 or 5 mm in a normal postmenopausal woman. However, there is considerable confusion as to which measurement should be used as a cutoff to trigger further investigations. In a study by Gull et al, the prevalence of endometrial carcinoma in patients with ET of <5 mm was 0.6%. A meta-analysis study by Smith-Bindman found that with the use of a cutoff of 5 mm, 96% of endometrial carcinomas would be detected in postmenopausal patients with bleeding. When this threshold was changed to 4 mm, it did not alter the sensitivity for cancer detection (sensitivity 96%); however, it increased the false-positive rate from 9% to 30%. They also found that TVUS was better at detecting cancer than it was at detecting polyps or hyperplasia. By using a 5-mm threshold, 96% of women with cancer had an abnormal ultrasound result, whereas 92% of women with endometrial disease had an abnormal ultrasound. In a prospective study by Granberget al of 1110 women with PMB, endometrial pathology was found most frequently when the ET was >8 mm, and no endometrial cancers were detected in women with ET <4 mm. Similarly, an evaluation of 419 women with PMB by Garuti et al assessed the sensitivity of 2 ET thresholds: 4 mm and 8 mm. The authors reported a diagnostic sensitivity of 95.1% and a specificity of 54.8% with the use of the 4-mm cutoff, and 83.8% sensitivity and 81.3% specificity when the 8-mm cutoff was used. Using a maximum of 5-mm ET to exclude carcinoma, a study by Briley et al of 182 women with PMB found no cases of carcinoma; however, 3 patients had hyperplasia. According to Levine et al, the variation in what is considered the upper limit of normal ET seems to be correlated with the body-mass index and type of HRT, with higher values in heavier women and in those taking combinations of estrogen and progesterone. Another study by Gull et al reported a 0.6% prevalence of endometrial cancer in women with PMB and ET <4 mm. This prevalence increased to 19% in women with an ET

<5 mm. The authors concluded that endometrial biopsy is not required in women with an ET <4 mm. Several studies also suggest that an ET >15 mm is highly suggestive of endometrial carcinoma, although on sonograms polyps can present as an endometrium >15 mm thick. Other authors suggest that a minimum sonographically measured ET of 6 mm should be utilized to reduce the number of false-positives.

Chapter Three

Material and Methodology

Chapter Three
Material and Methodology

3.1 Materials:

3.1.1 Sample size:

Including 50 postmenopausewamens with the age range from 45 to 80 years old, complaining of vaginal bleeding.All patients had had amenorrhea for at least 12 months.

3.1.2 Study area and Machine used:

The study was done in Repuplic of Yemen in Sanaa city in alkhazan hospital by using Edan ultrasound machine with 5 or 7.5 MHZ transvaginal probe (T.V)

3.1.3 Study duration:

From December 2013 to agust 2014

3.2 Methodology:

3.2.1 **Technique** used:

The transvaginal transducer is coated with u/s gel and then covered with a protective sheath. Air bubbles should be eliminated to avoid artifacts. An external lubricant is then applied to the outside of the protective covering. The transducer then inserted into the vagina with the patient in (lithotomy position) supinewtih empty bladder, knees gently flexed and hips elevated slightly on a pillow. With gentle rotation and angulation of the transducer, both sagittal and coronal images can obtained. Slight anterior angulation of the transducer will bring the fundus of an anteverted uterus into view. To visualize the cervix the

transducer must be pulled slightly outward. Mild angulation may be needed to visualize the entire adnexa and cul- de- sac. The tip of the transducer can be used to evaluate for areas of focal tenderness. The following sonomorphological parameters were assessed .size of the uterus(length, width,hight),endometrial thickness endometrial morphology (homogenous, hetrogeneous),endometrium border (regular,irregular). Morphology of lesion (hypo,hyper.mixedechogencity).

3.2.2 Study design:

Retrospectivestudy using the patient information need for this study.

3.2.3 Inclusion criteria:

Marriedpostmenopausal Patients attending to Alkhazan hospital, with vaginal bleeding.

3.2.4 Exclusion criteria:

Unmarriedpost menopause Patients

3.2.5 Method ofevaluation:

By data collection sheet containing:(1)personal data (Age and clinical findings).(2) Ultrasonic findings (uterine texture, endometrium thickness, Echogensity, Site of lesion,).

3.2.6 Ethical consideration:

Was taken while collecting the data.no information more than need used

3.2.7 Data analysis:

The collected data arranged in master sheet and the computer and analyzed by excel andfrequency tables and presented in form of graphes, tables, and figers.

3.2.8 Data storage:

The datawas stored in my personal computer and flash.

Chapter four

Chapter four

4.1 Result and analysis:

This study was carried out on 50 patients of postmenopausal bleeding were examined with the following result according to the age, clinical, size &shape of uterus , and ultra sound findings.

Table 4.1 shows the frequency distribution and percentage according to the age group.

Age group	Frequency	Percent (%)
45-54	10	20
55-64	25	50
65-74	12	24
75-80	3	6
Total	**50**	**100**

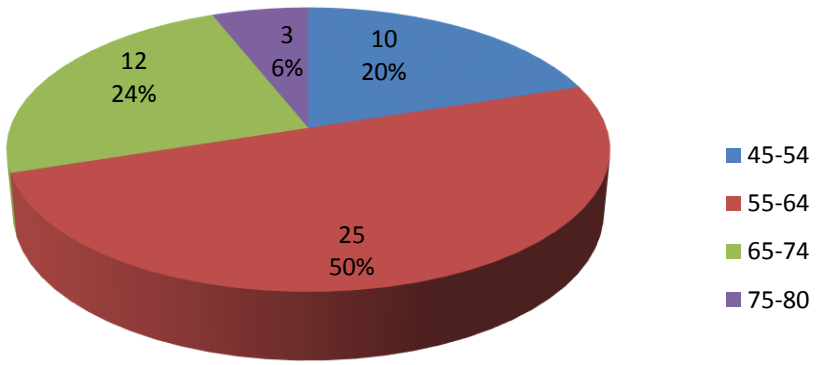


Fig 4.1 shows the frequency distribution and percentage according to the age group.

Table 4.2 shows the frequency distribution and percentage according to uterine size

Size of uterus	Frequency	Percentage
Normal	10	20%
Small	32	64%
Bulky	8	16%
Total	50	100

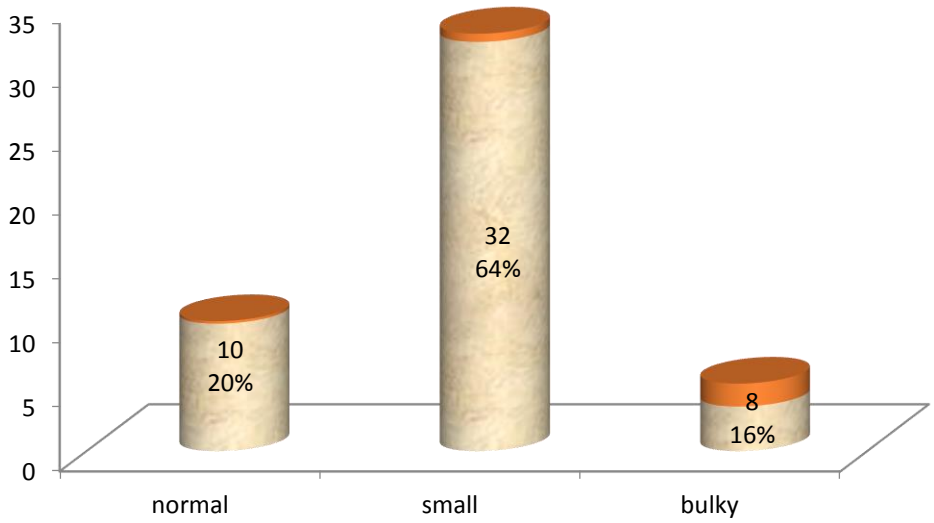


Fig 4.2: shows the frequency distribution and percentage according to uterine size

Table 4.3 show frequency distribution according to Clinical symptoms of postmenopausal bleeding

Symptom	Status	Number of cases/frequency	Percent
Contineousv.bleeding	Positive	13	26%
	Negative	37	74%
	Total	50	100%
On&offv.bleeding	Positive	37	74%
	Negative	13	26%
	Total	50	100%
Pelvic &back pain	Positive	32	64%
	Negative	18	36%
	Total	50	100%

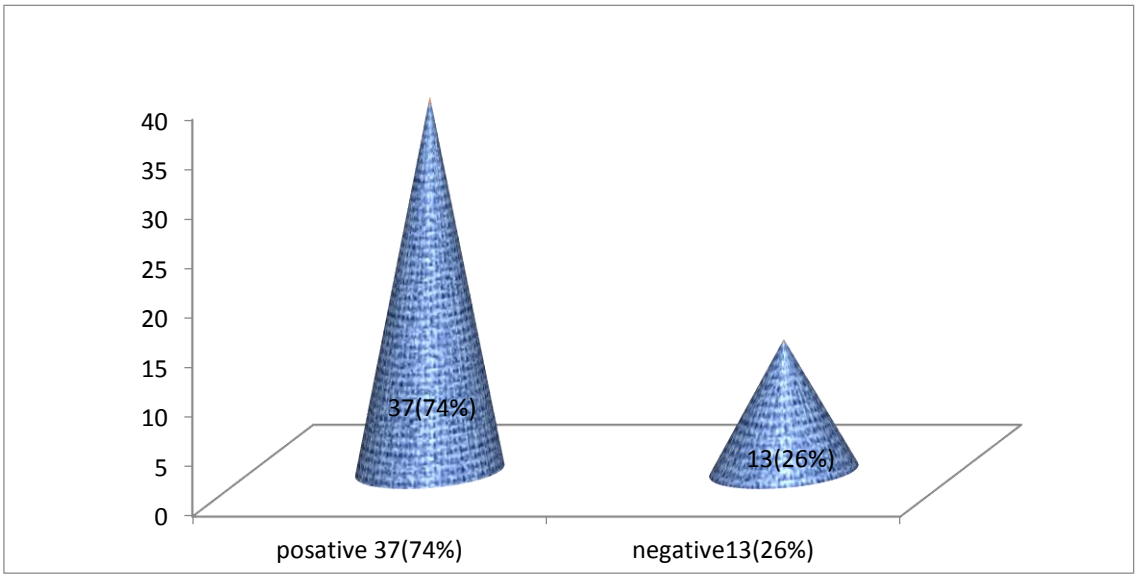


Fig 4.3.1show frequency distribution according to on&off vaginal bleeding

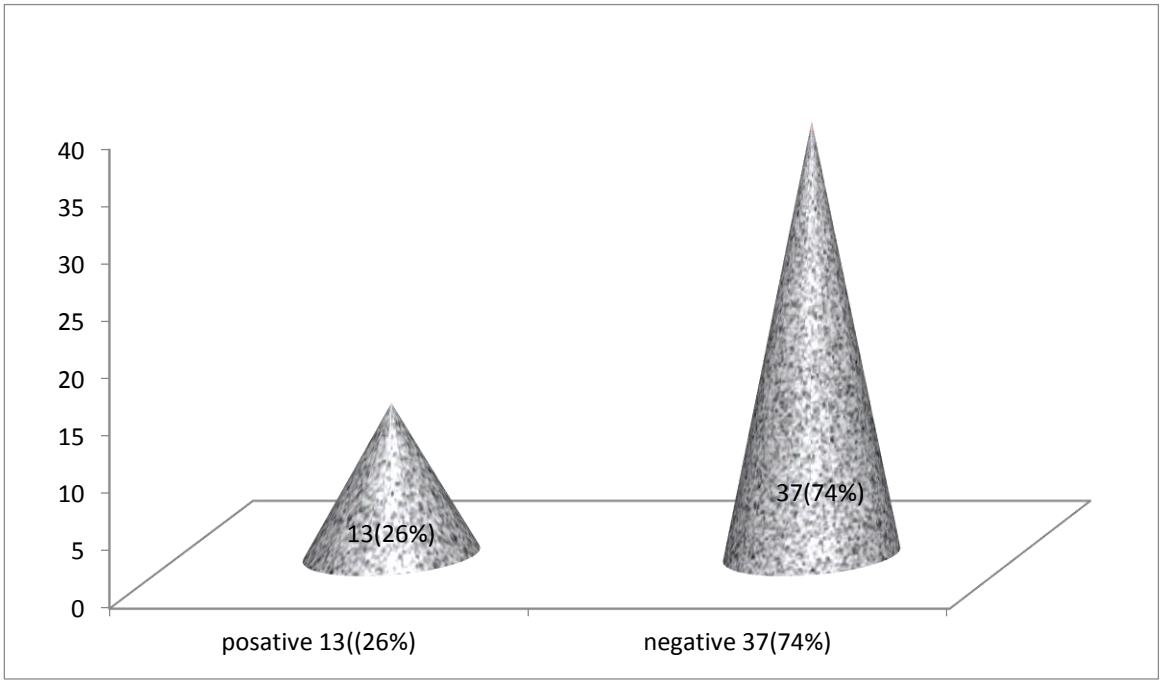


Fig 4.3.2: show frequency distribution &percentage according to Continuous vaginal bleeding

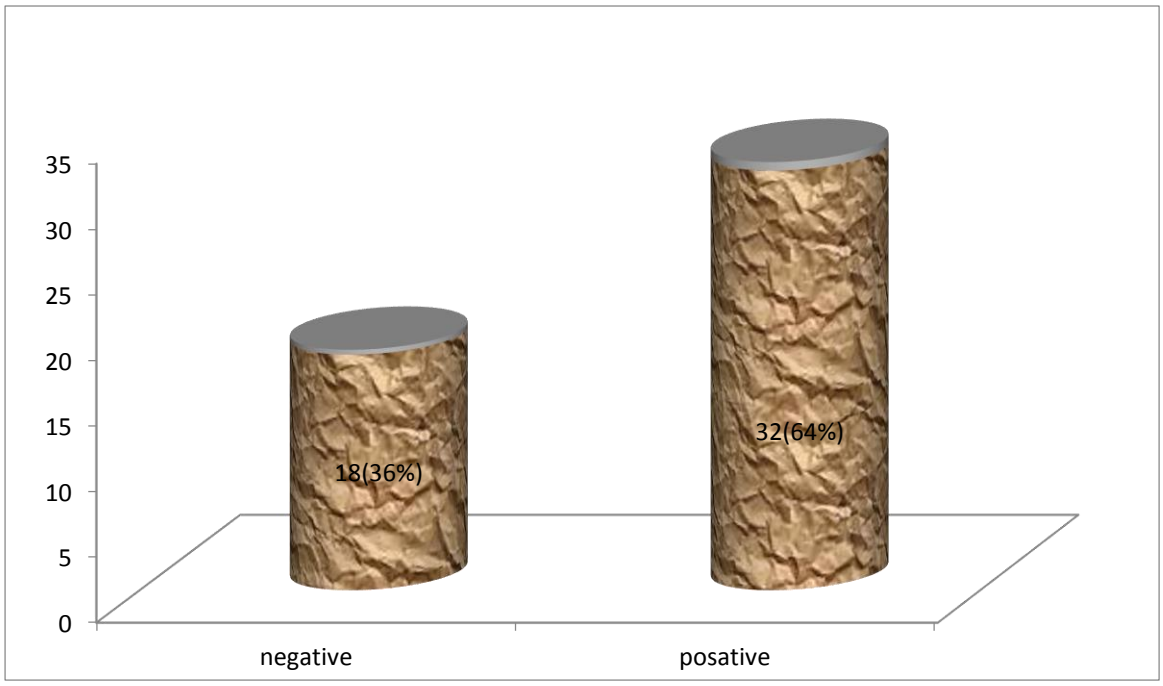


Fig 4.3.3: show frequency distribution &percentage according to Pelvic pain

Table 4.4 shows frequency distribution according to endometrium thickness

Eendometrium thickness	No	%
<5 mm	40	80
>5 mm reguar	06	12
>5 mm irregular	04	08
total	50	100

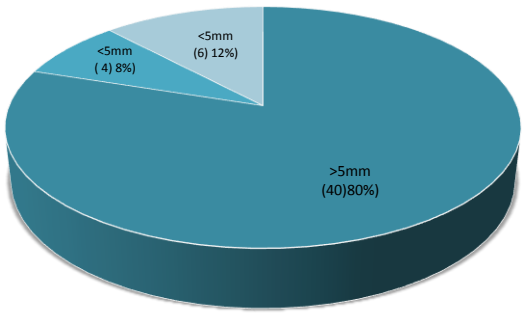


Fig 4.4: show frequency &distribution according to endometrium thickness

Table 4.5: Shows the frequency distribution and percentage according to shape ofendomtium

No	shape	No of cases/frequency	Percent
1	Irregular	24	48%
2	Rregular	26	52%
3	Total	50	100%

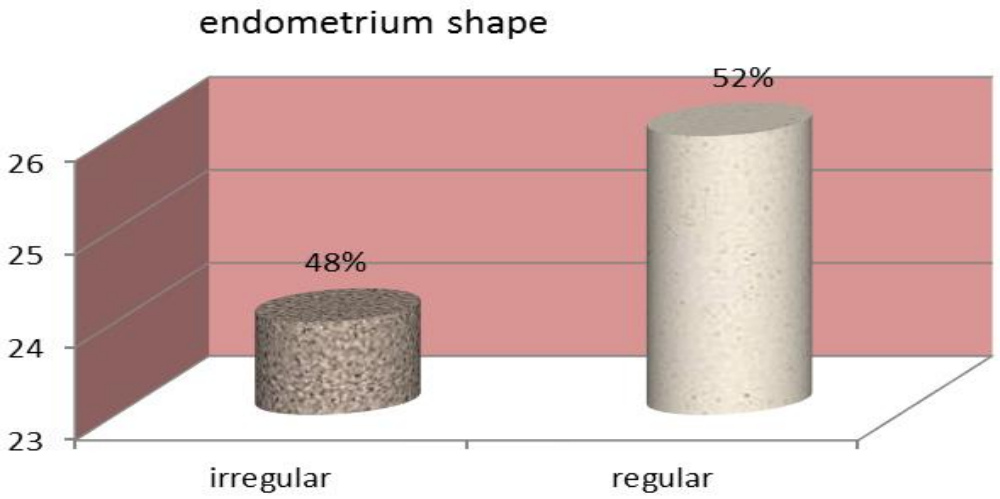


Fig4.5: shows the frequency distribution and percentage according to shape of endomtium

Table 4.6shows frequency distribution & percentage according to echogencity of lesions

No	Echogenicity of lesions	No of cases/ frequency	Percent
1	Hyperechoeic	10	20%
2	Hypoechoeic	29	58%
3	Mixed	11	22%
4	Total	50	100%

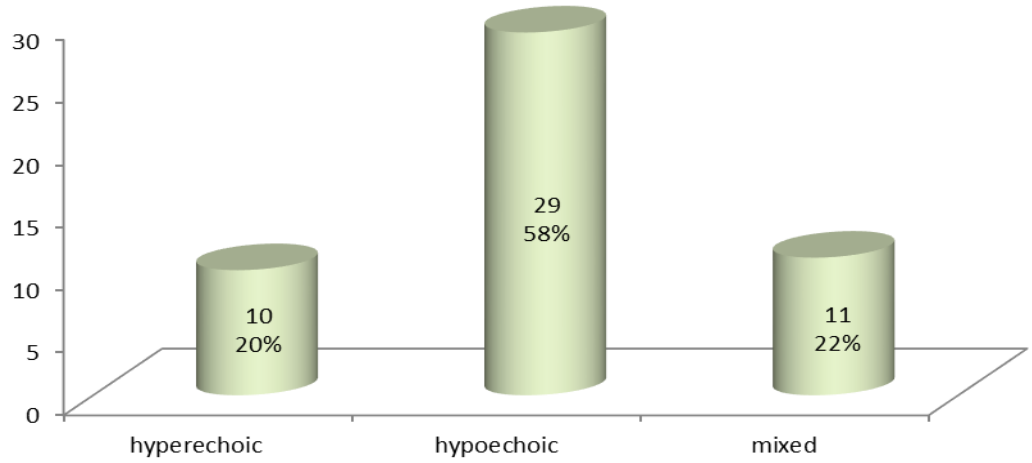


Fig 4.6 shows frequency distribution & percentage according to echogencity of lesions

Table4.7: Shows the frequency distribution and percentage according to type of lesion.

	Site of lesion	No of cases	Percent
1	Endometrial polyp	25	50%
2	Myometrial leiomyoma	16	32%
3	Endometrial hyperplasia	4	8%
4	Extra uterine (adnexea) (Cystic mass)	5	10%
5	total	50	100%

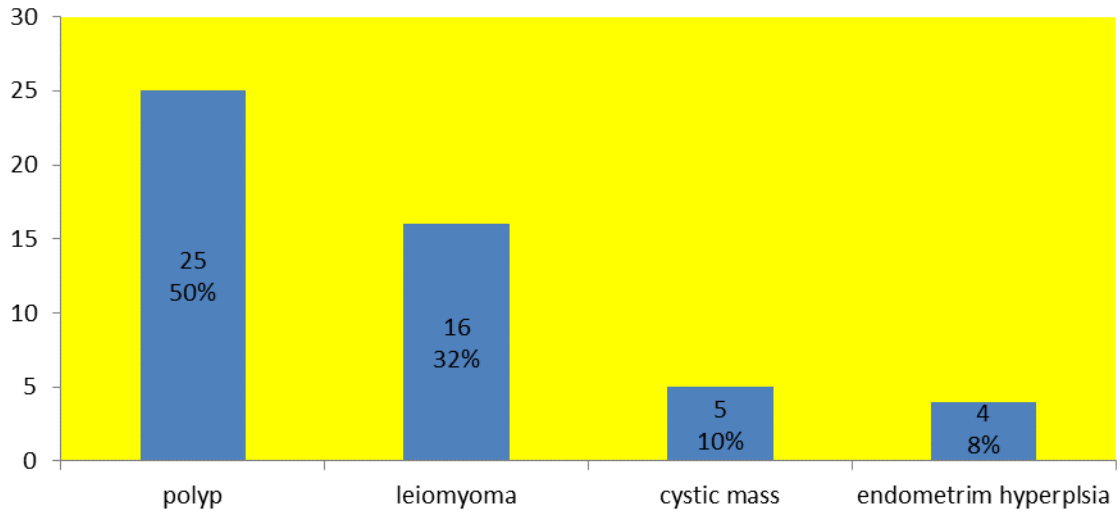


Fig 4.7: Shows the frequency distribution and percentage according to type of lesion.

Table 4-8: Distribution of endometrial pathology based on endometrial thickness and age of study groups.

Age group	Endometrialthickness>5mm			Endometrialthickness ≤5mm			NO %
	hyperplsia	polyp	leiomyoma	hyperplsa	polyp	Leiomyoma	
45-54	2	-	3	-	-	5	10(20%)
55-64	1	18	5	-	-	1	25(50%)
65-74	-	8	4	-	-	-	12(24%)
75-80	1	-	-	-	-	2	3(6%)
Total	4	26	12	-	-	8	50(100%)

Cystic mass (in adnexae) was detected (table 4.7).

Chapter five

Chapter five

5.1 Discussion:

The study found that the postmenopausal bleeding common in age group (55–64) years with frequency (25) constitute with 50% table (4.1) followed by age group (65-74)years with frequency12 constitute with 24% and age (75-80)years with frequency (3) constitute with 6%.

Table (4.2) showed the frequency and percentage of uterine size of postmenopausal women complain of vaginal bleeding table revealed that (32of 50)

Had small uterus followed by (10 of 50) had normal size and (8of 50) bulky uterus.

Table (4.3) showed the frequency and percentage of patient symptoms, the table revealed that (37of50) complain on&of vaginal bleeding followed by (13of50) complain of continuous bleeding and (32of50) with pelvic &back pain as shows in figure 4.3(1,2,3) .

Table (4.4) showed the frequency &percentage of patient (were examined by transvaginal ultrasound) endometrium thickness,Endometrium thickness ⩾5 mm in patient with vaginal bleeding detected in (40 of 50) (20 regular and 20 irregular) cases followed by endometrium thickness <5mm (regular) in 6paients and endometrium thickness <5mm (irregular) in 4paients.

Endometrial shape of study cases described in table (4.5). (24 of 50)is irregular endometrium while (26 of 50) is regular endometrium.

The transvaginal ultrasound examination in respect to echogencityof lesion showed that(10) were hyperechoic,(29) hypoechoic and(11) were is mixed (table 4.6).

In 25(50%) of cases lesion detected is endometrial polyp, but only 16 is myometrialleiomyomas while 4 is endometrial hyperplasia and 5 is extra uterinecystic mass(inadnexae) was detected (table 4.7).

Table (4.8) showed that hyperplasia was detected in age group (45-54)in two patient were enometrium thickness more than5mm(>5mm) ,one patient in age group (55-64))and one in age group (75-80) .while polyp detected 18 in age group (55-64), 8in age group (65-74) ,where leiomyoma detected 3 in age group (45-54), 5 in age group (55-64) and 4 in age group (65-74).

With endometrium thickness less than 5mm(<5mm) not detected hyperplasia nor polyp but leiomyoma was detect in 5patients in age group (45-54) , one in age group (55-64) and two in age group (75-80) .

Measurement of ET by TVS can be utilized in post-menopausal women to avoid unnecessary biopsy,

The optimal cut off ET for the diagnosis of pathology in this study was less than or more than 5mm .Gupta et al. have demonstrated that less than or equal to 5mm cut off levelcould rule out EP with good certainty.So, the result of our study is in agreement with the Gupta's study. Goldstein found that the risk of malignancy is one in 917 when the endometrial thickness in women with post-menopausal bleeding is less than or equal to 4.Karlsson et al. reported that no EP was found at the histopathologyexamination after dilatation and curettage when the ET is less or equal 4 mm.Other studies

reporteda range of 5 to 8 mm (post -menopausal) cut off ET shall be considered to rule out endometrialpathology in abnormal uterine bleeding.

Gull et al. suggested that no endometrial cancer is missed when the ET cut off value of less than or equal to 4 is used. They concluded that TVS scanning is an excellent tool for the determination of whether a further investigation with curettage or some form of endometrial biopsy is necessary.Timmermans et al. found that transvaginal ultrasonography is the first-line test in assessment of postmenopausal bleeding.

Auslender et al. reported that all women with an ET of 3mm or less have atrophic endometrium and ET of 3mm or less would have reduced the number of dilatation and curettage procedures by 45%, and no cases of endometrial pathologies would have been missed.Therefore, in comparison to our study, there are different cut off levels of ET suggested in other studies.But, it is approved that TVS is an appropriate tool for diagnosis of EP. This study demonstrates a cut off level of less than 5mm or more of ET for diagnosis of EP and theresult of this study is in agreement to some other studies that proposed the cut-off point of 4 and 5 mm.

5.2 Conclusion:

Postmenopausal vaginal bleeding is a common clinical problem. Most reports in the clinical literature indicate that endometrial atrophy is the most common cause of PMB; however, the results of study with transvaginalsonography (TVS) indicate that anatomic abnormalities such as leiomyomata and polyps are much more common.Transvaginal ultrasound(TVS) in patients with PMB improves diagnostic accuracy, clinical decision making, and the clinician's diagnostic certainty.

TVS has been shown to be useful for evaluating the endometrium, particularly in patients with PMB. Even when the endometrial thickness is 5 mm or less, it is accurate in identifying an anatomic cause of the bleeding.

This study was done between October 2014 and Octobr2014 including 50 females with the age range from 45 to 80 years old,complaining of postmenopausal bleeding they were attended to alkhzan hospital in Sanaa (Yemen).

Because of its noninvasive, increased accuracy and decreased cost of the ultrasound, we used it for imaging refered patient by using Edan ultrasound machine with Transvaginal probe (TVS) 6 MHz to detect the cause of postmenopausal bleeding.

We found that (40 patients) 20 of them had irregular outline of endometrium the thickness more than (> 5mm), the other half were with regular endometrium also with thickness (>5mm).

6 patients had less than 5mm (<5mm) were regular and 4 patients also less than 5mm(<5mm)were irregular endometrium

In our study also we found 10 patients with hyperechogncity of lesion ,then 29 patients with hypoechogenic and the rest 11patients mixed echogencity .

25 of the cases the lesion detected is endometrial polyp ,but only 16 is myometrialleiomyomas while 4 is endometrial hyperplasia and 5 is extra uterine cystic mass.

TVS is helpful to physicians&gynecolgists when detecting any abnormality so they usedto do further examine patients in an attempt to define an anatomic cause of the PMB. With these diagnostic issues, we conducted a clinical trial to evaluate the accuracy of transvaginalsonogrphy and assess the effect of this examination on diagnostic confidence and therapeutic clinical decision making among referring gynecologists and primary care physicians caring for patients with PMB.

5.3 Recommendations:

- TVS should be done in a postmenopausal woman with vaginal bleeding to exclude malignancy and other pathologic state.
- Transvaginal ultrasonography shoud be done in women with postmenopausal uterine bleeding to exclude endometrial thickness.
- transvaginal ultrasonography should be performed when endometrial biopsy is performed and tissue is reported as insufficient for diagnosis,.
- When transvaginal ultrasonography is performed for patients with postmenopausal bleeding and an endometrial thickness of less than or equal to 4 mm is found, endometrial sampling is not required.
- Endometrial thickness of greater than 4 mm in a patient with postmenopausal bleeding should trigger alternative evaluation (such as sonohysterography, office hysteroscopy, or endometrial biopsy), to detect early any endometrial cancer
- Other researches recommended

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Appendix A

Sudan University of Science and Technology
Facility of Graduate Studies
Role of TransvaginalUltrasonograghy in the
Postmenopausl Bleeding
Data Collection Sheet
(Questionnaire)

Date …… No ……..….
Name…….. Age ……

Age group: 45-54 ( ) 55-64 ( )

65-74 ( ) 75-80 ( )

Clinical finding:
Uterine bleeding ( ) Pelvic pain ( )

Ultrasound finding:
Endometrium thicknesss
⩾5 mm ( ) <5 mm ( )

Endometrium shape:
Regular ( ) Irregular ( )

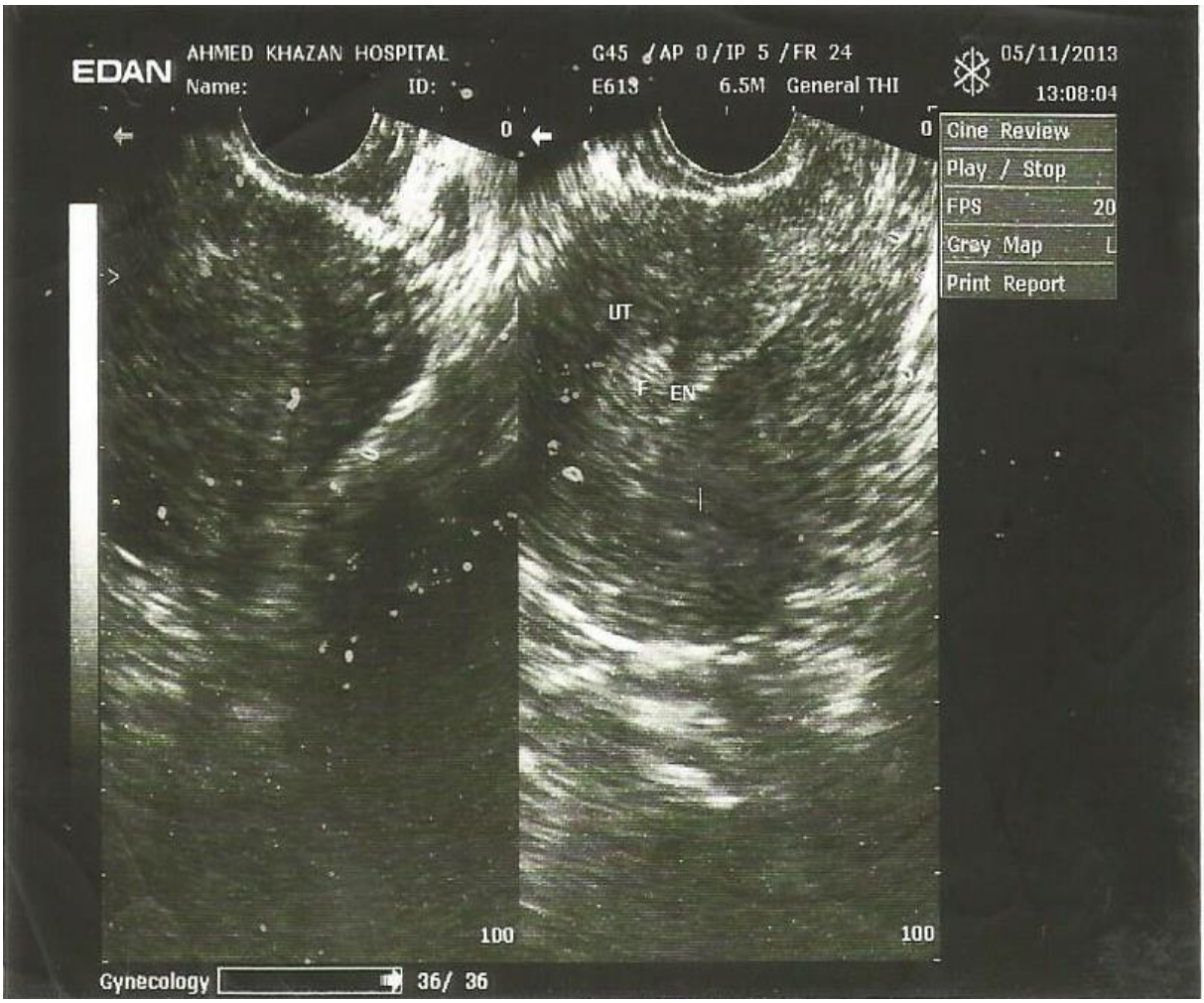
Uterus size:
Normal ( ) small ( )
Bulky ( )

Echogencity of Lesion:
Hyper echoic ( ) Hypo echoic ( )
Iso echoic ( ) Mixed ( )

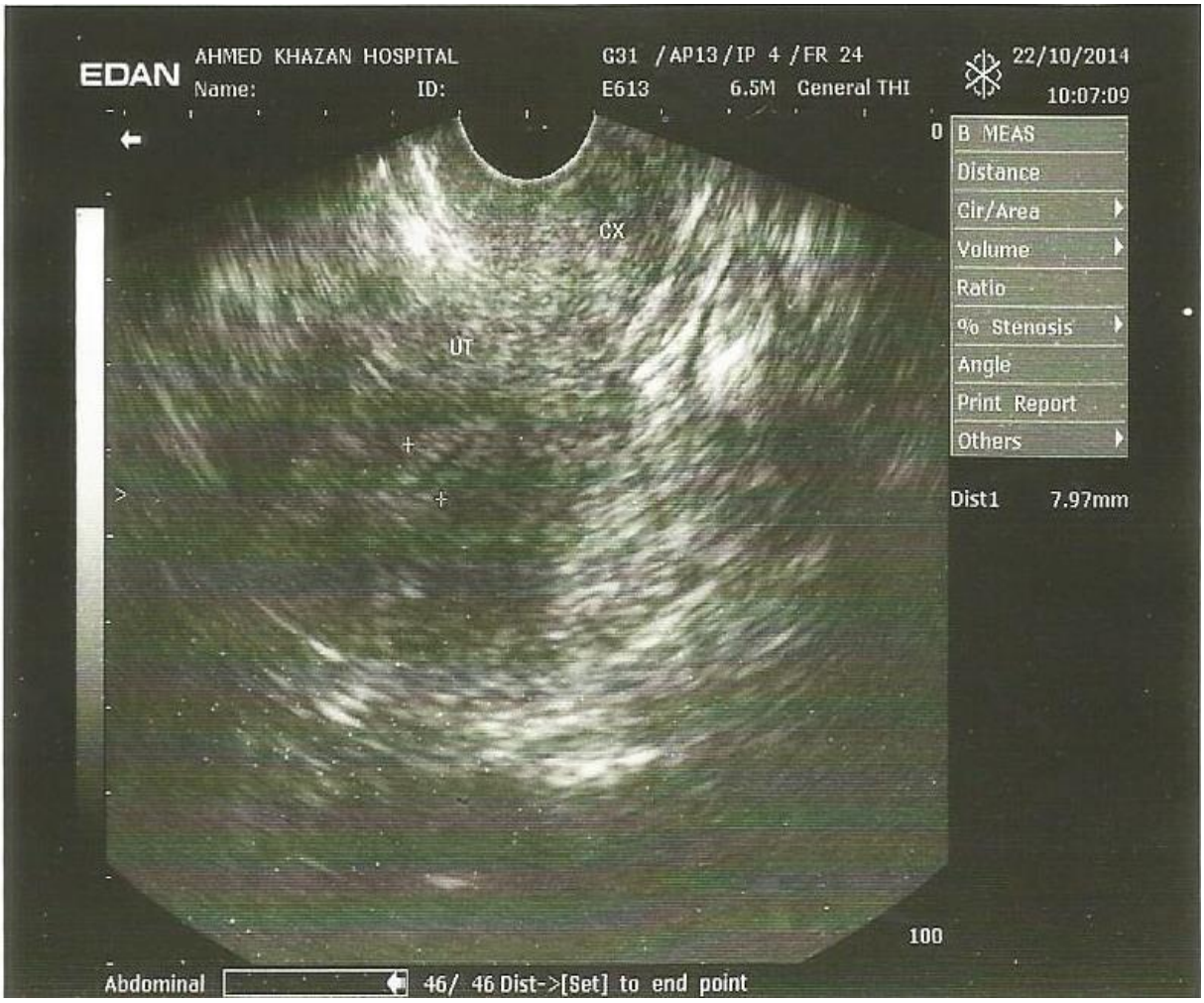
Type of Lesion:
Intra uterine:
leiomyoma ( ) polyp ( ) endometrium hyperplasia ( )

Extra uterine:
Cystic mass ( )
cervix : regular ( ) irregular ( )

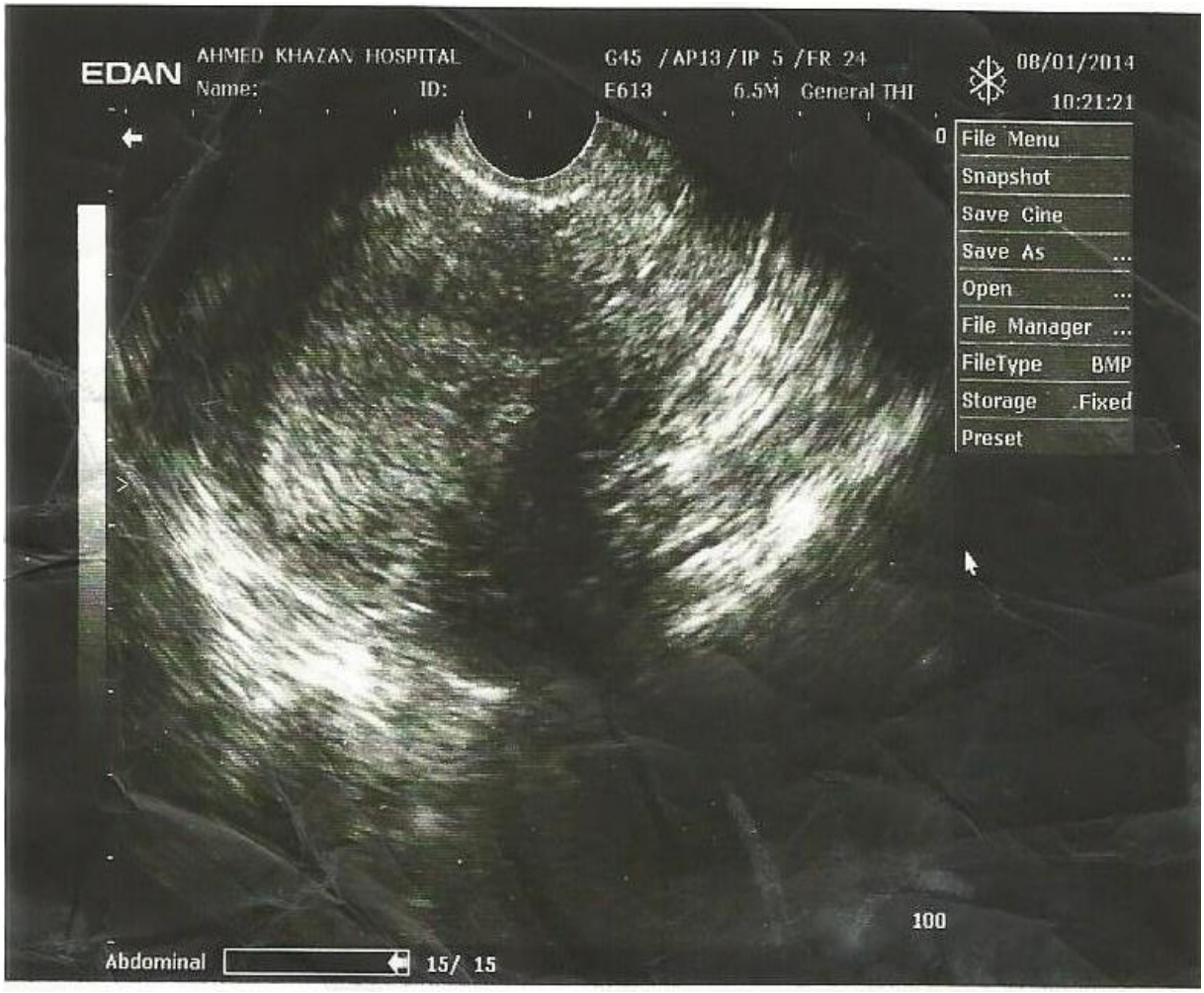
Appendix B



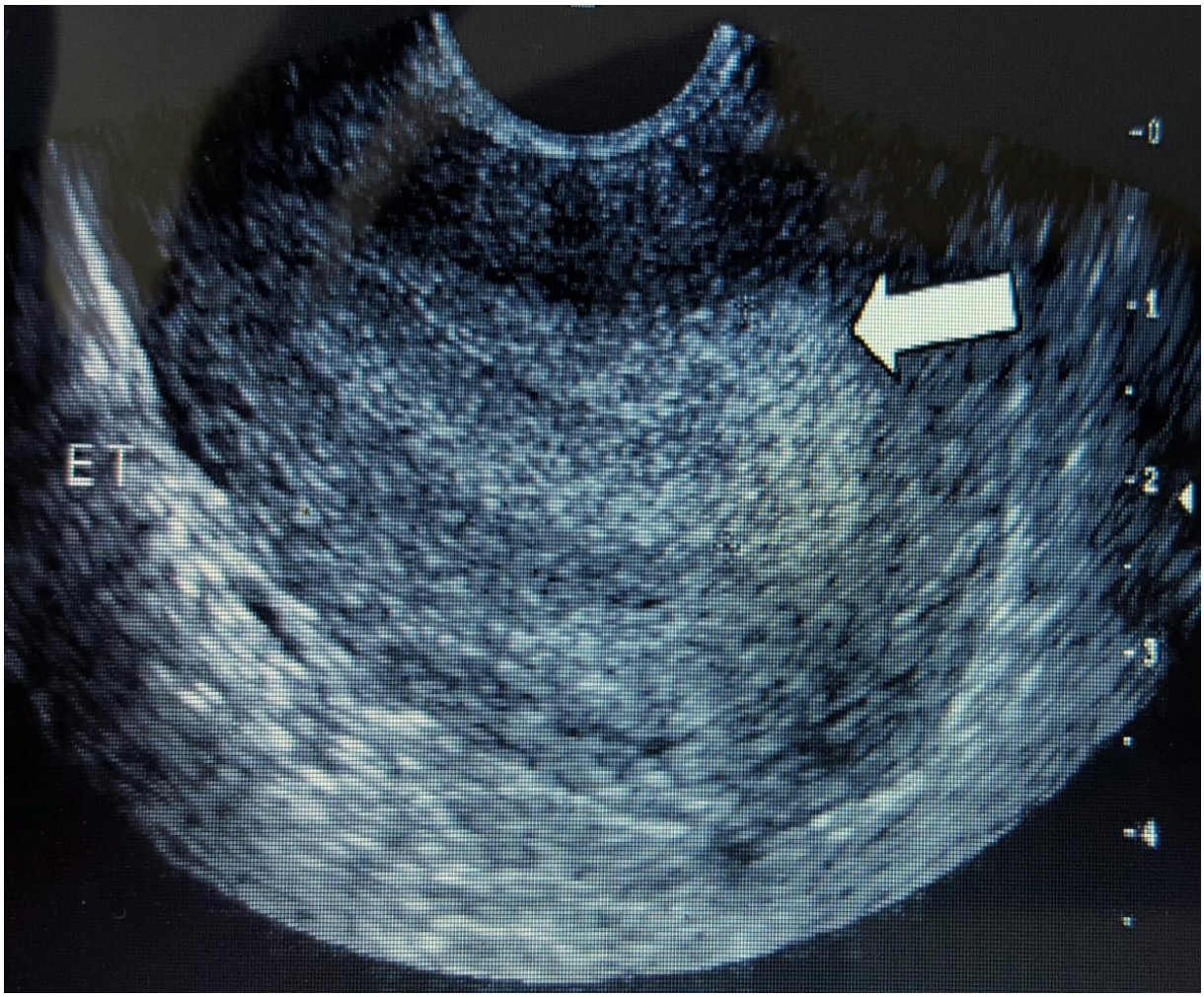
A .B .1 lady with 65years old, TVS image showed endometrial polyp



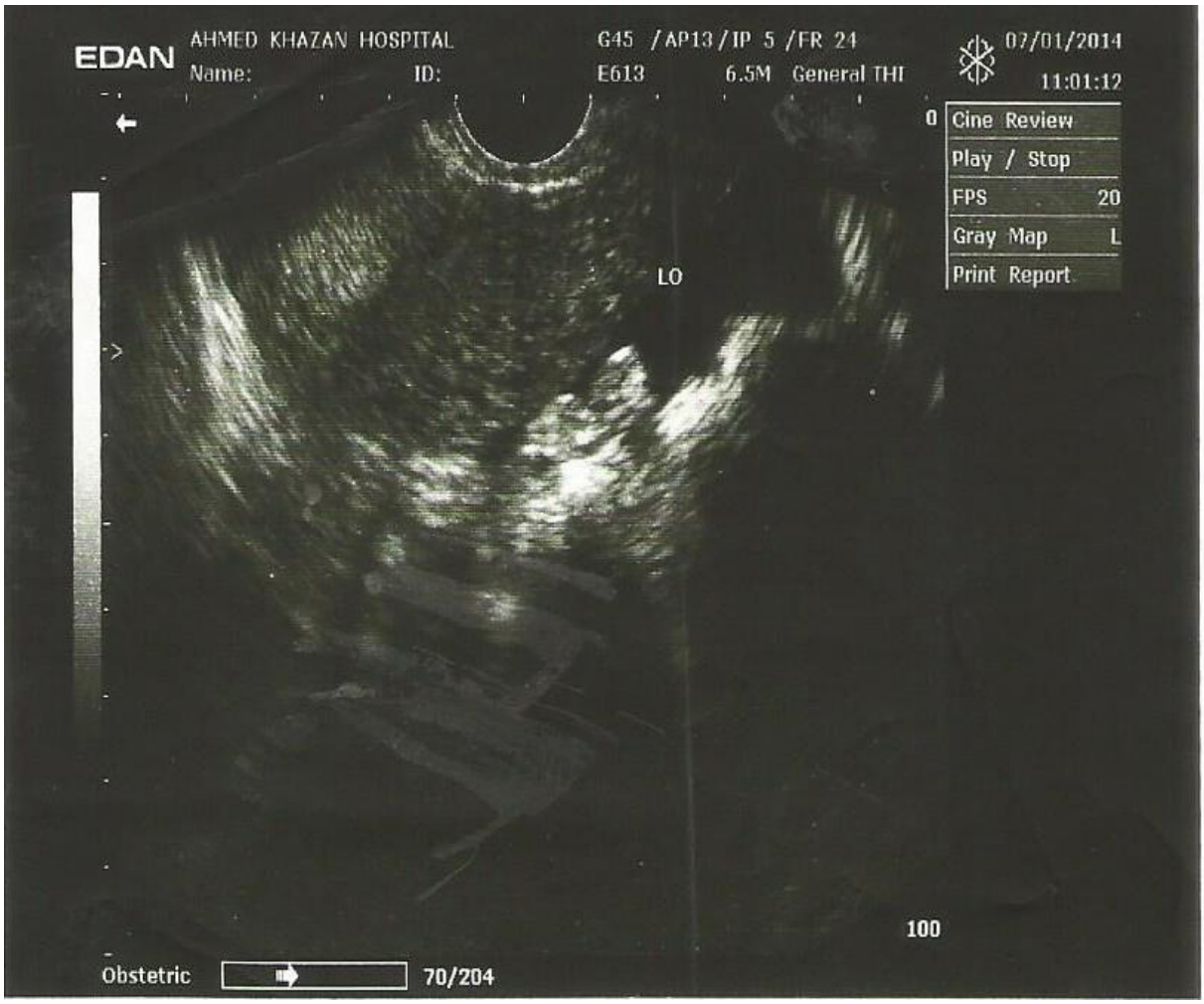
A .B 2 52 years old women with v.bleeding TVS showed irregular endometrium with fluid collection seen in cavity (blood)



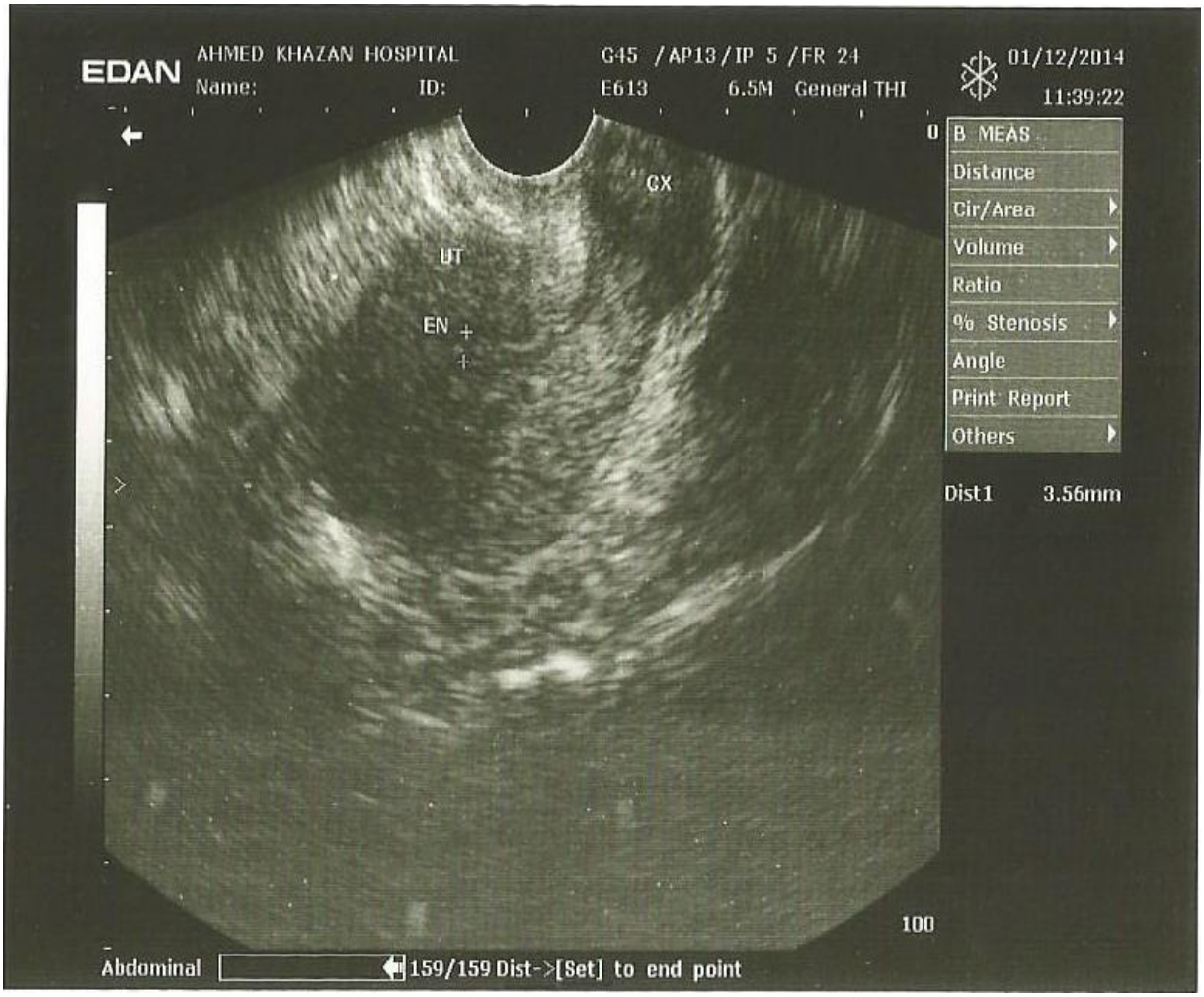
A.B .3 .49 years old lady came with v.bleeding ultrasound showed endometrial hyperplasia



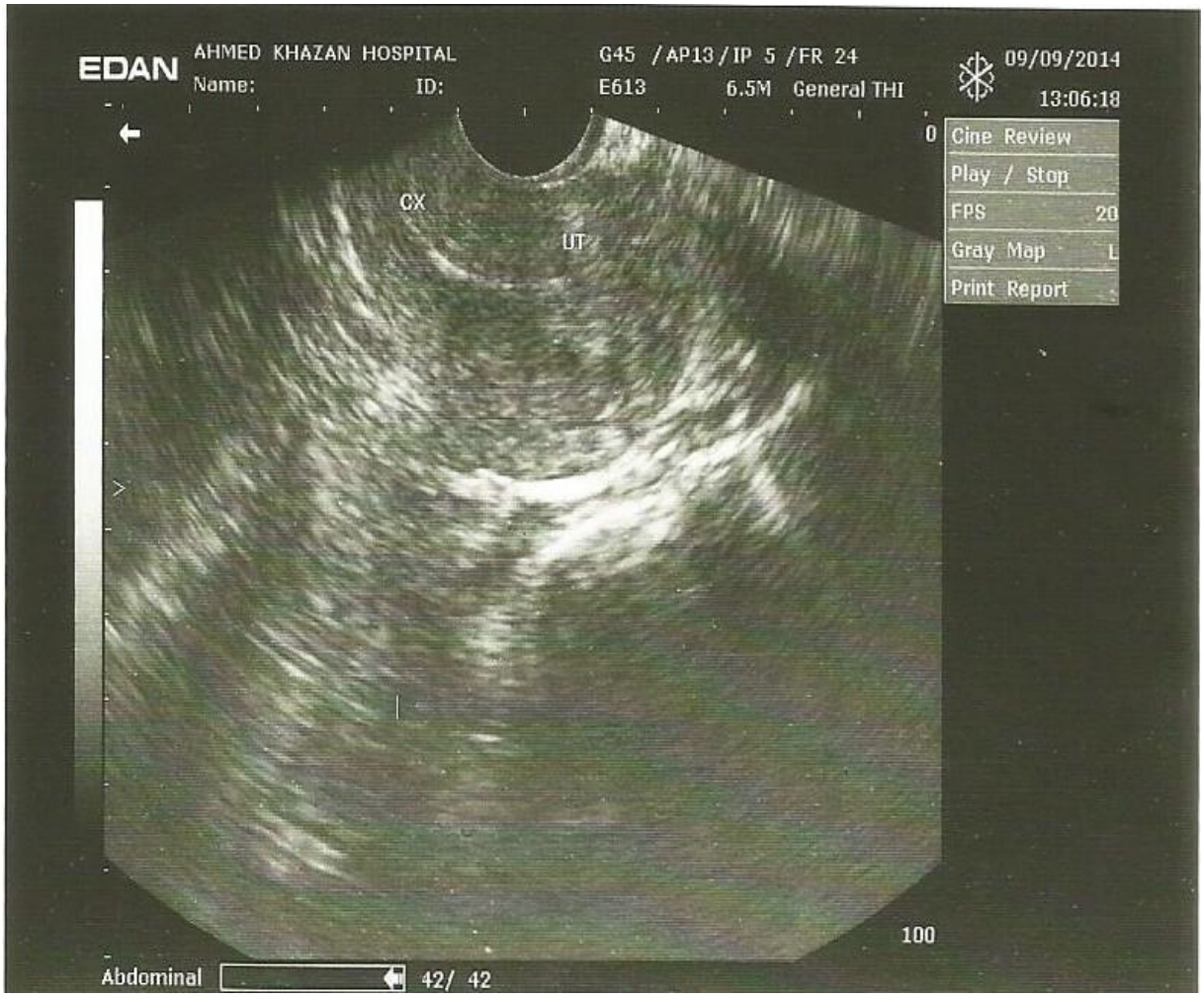
A.B .4 .64years women TVS was done , it showed that endometrial hyperplasia



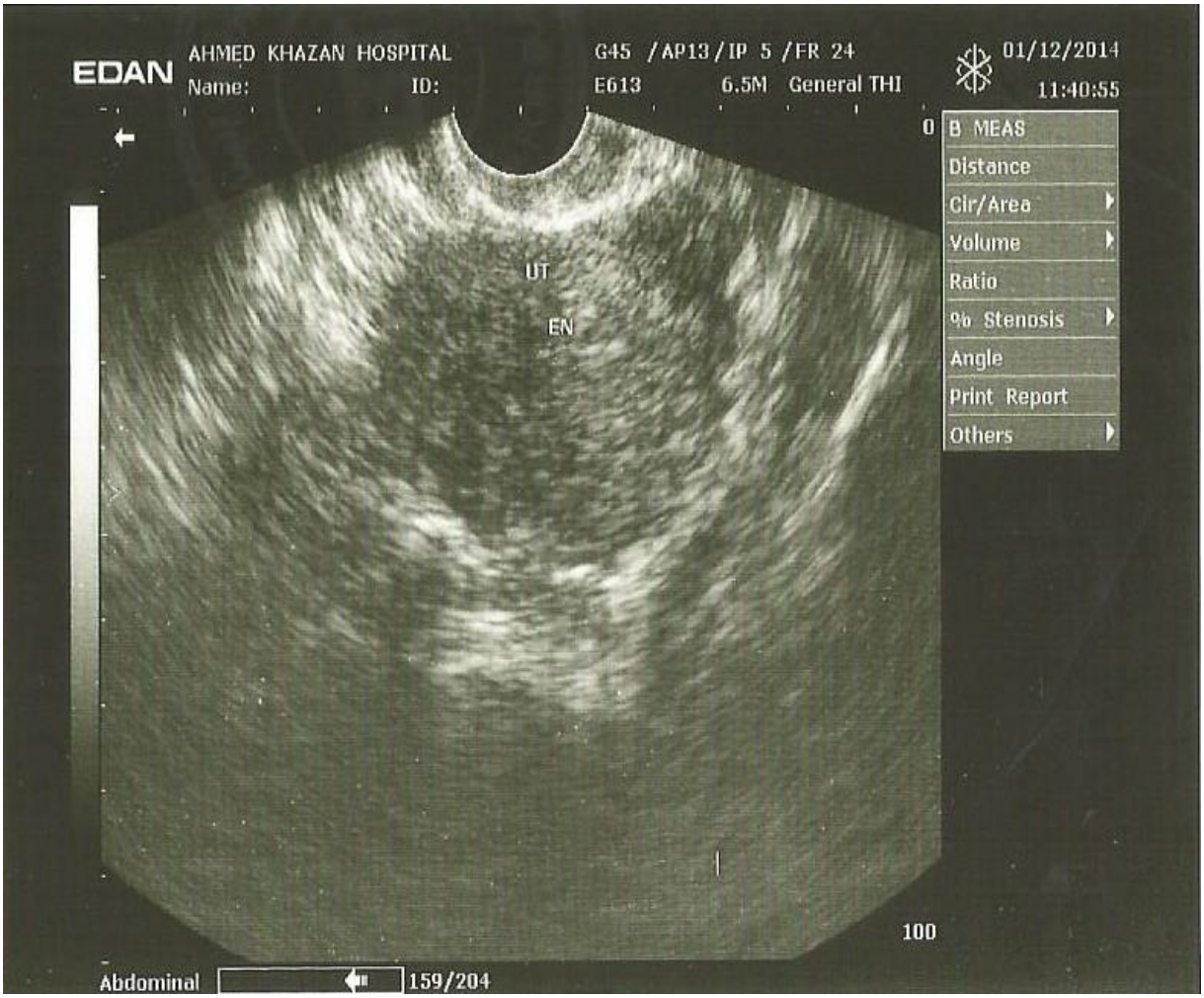
A.B .5 50 years women c/o vaginal bleeding .TVS was done,it showed intramural fibroid (leiomyoma)



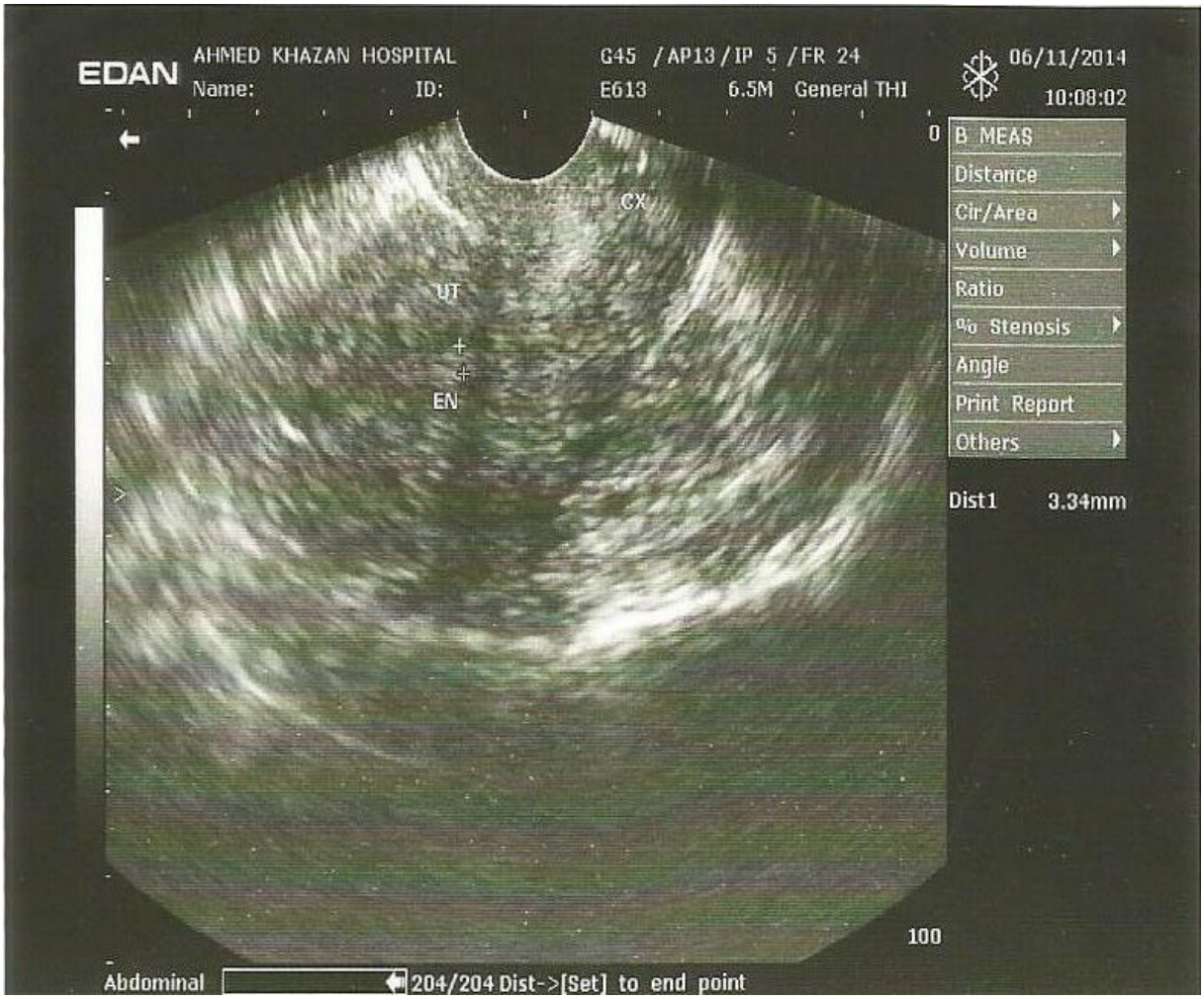
(B. 6) 55 years old women ,the ultrasound image showed thin irregular endometrium



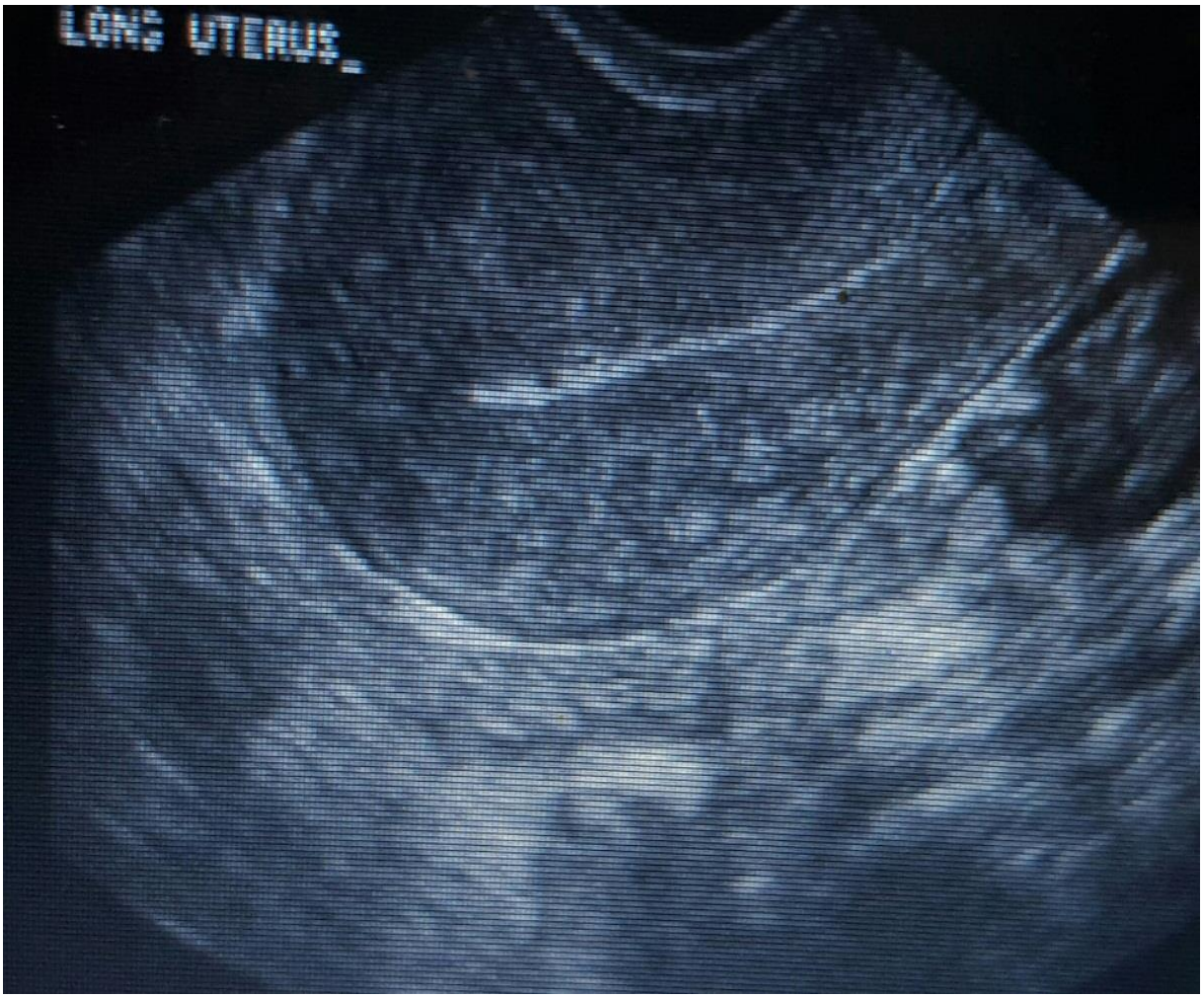
A (B.7) 72 years women with abnormal v.bleeding. TVS showed thin regular endometrium



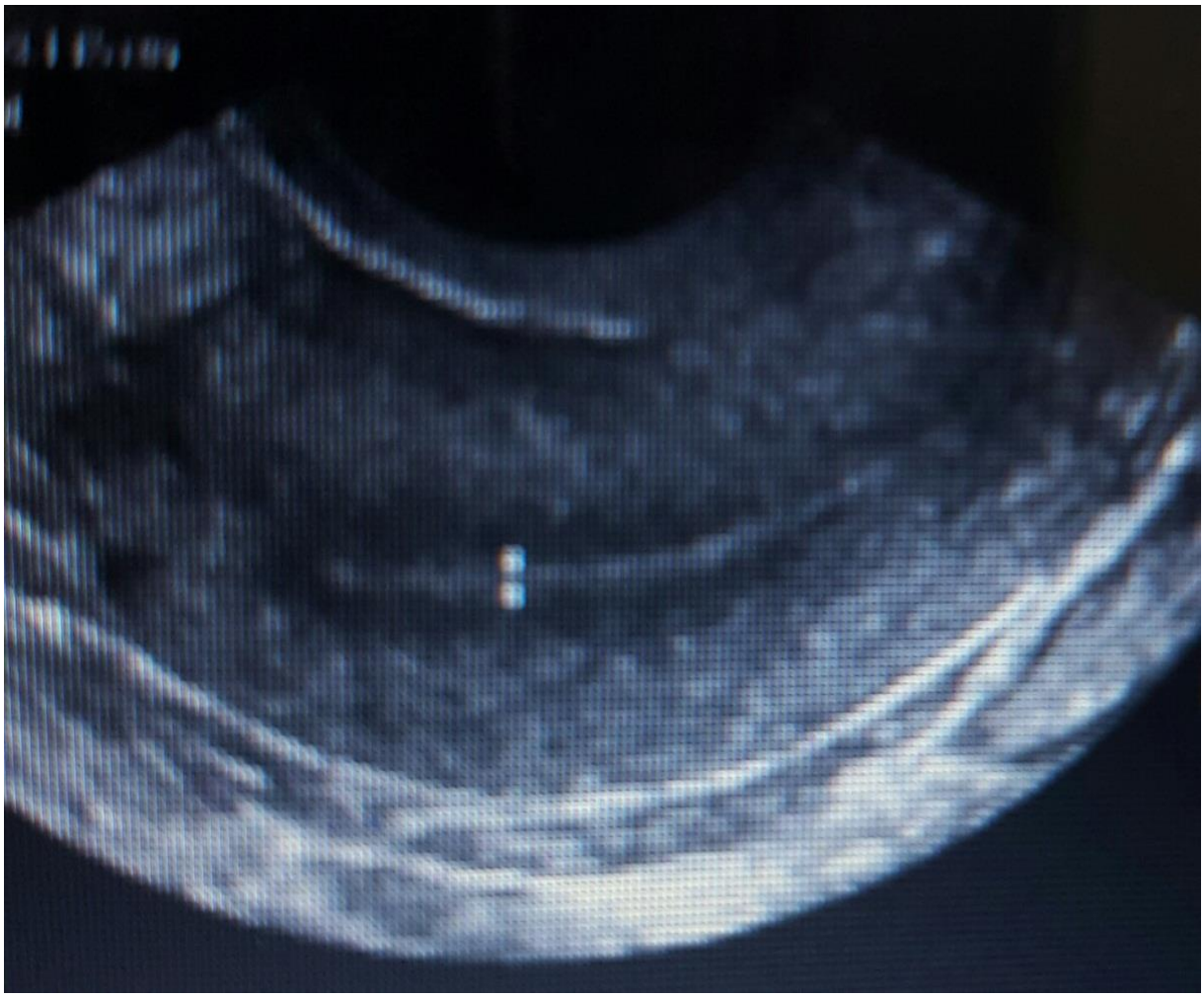
A (B.8) 60 years women with abnormalv.bleeding the ultrasound showed posterior intramural fibroid (leiomyoma)



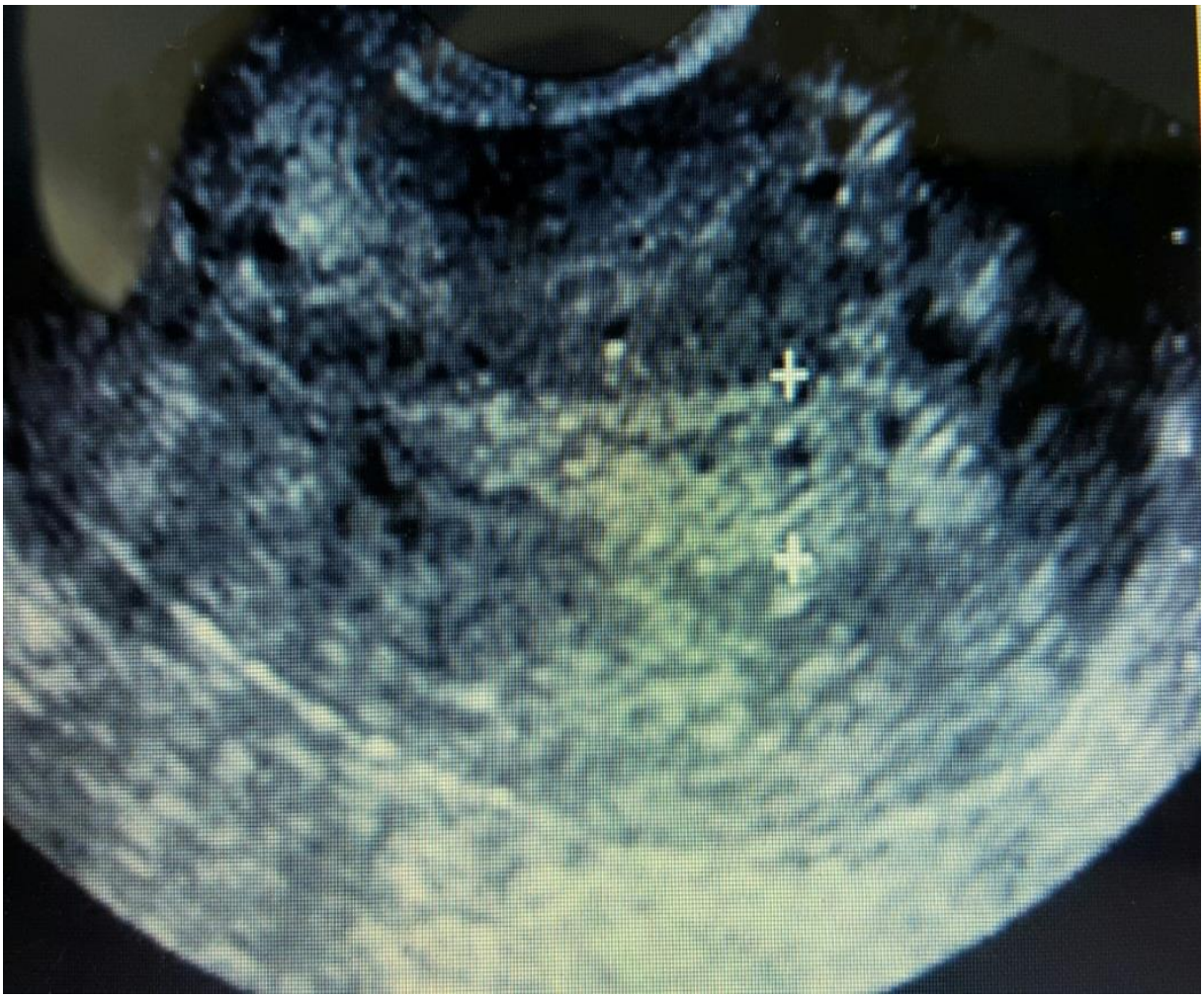
A (B.9) 55 years old lady c/o vaginal bleeding , the u/s image showed thin endometrium &small posterior fibroid



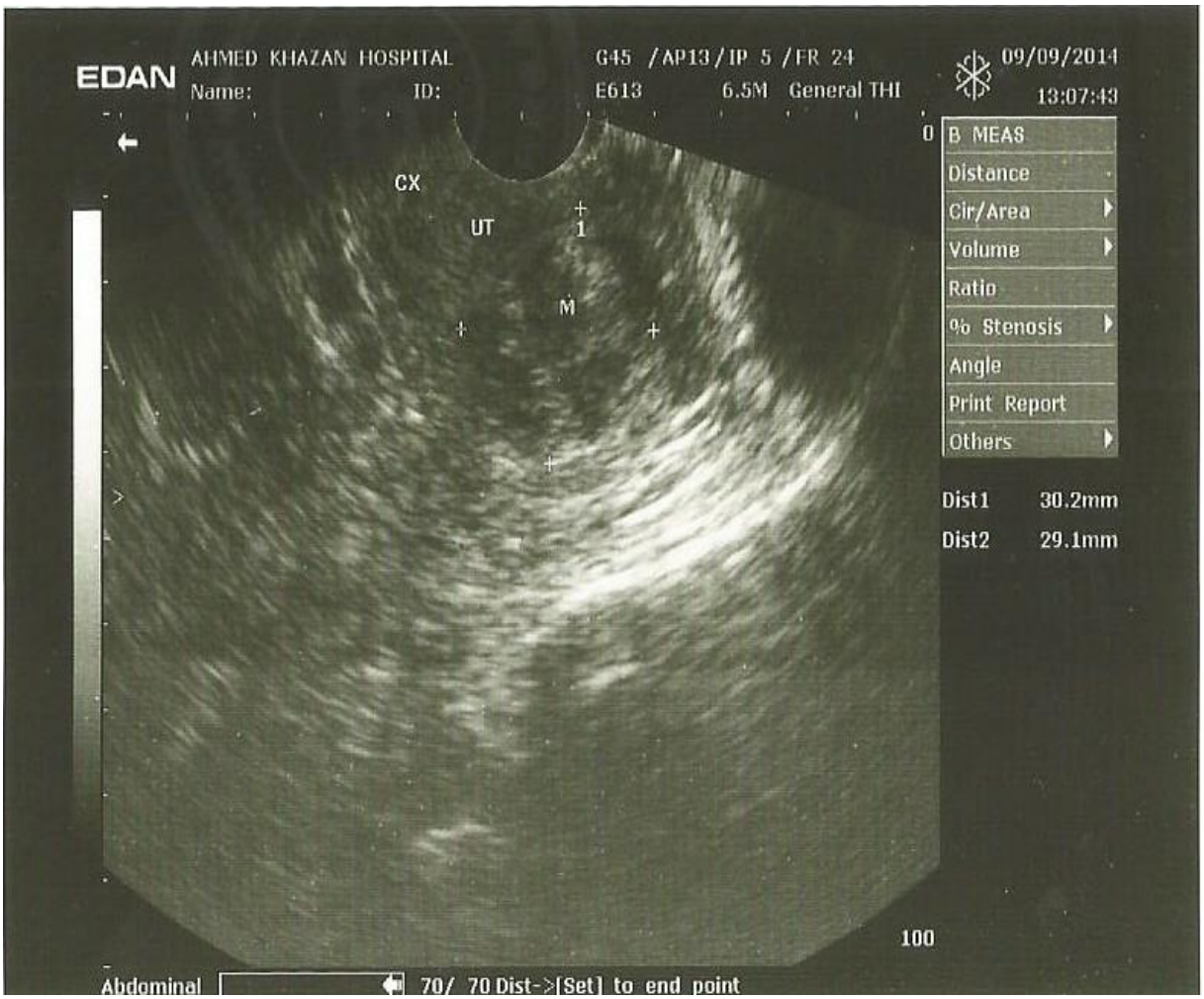
A (B.10) ,67 years women with v.bleeding, her image showed thin regular endometrium & anterior leiomyoma.



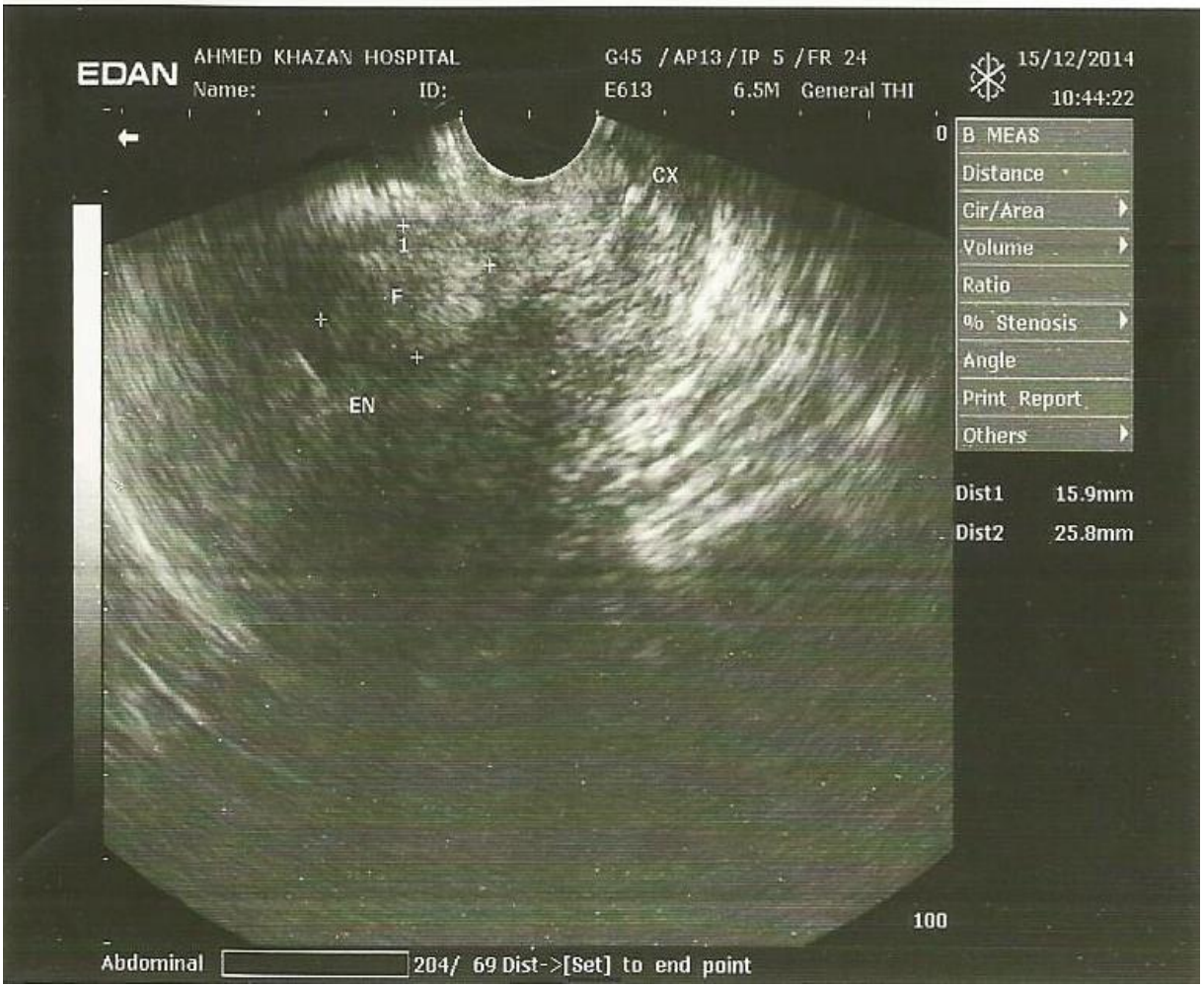
A (B.11) u/s image showed thin regular endometrium in 57 years post menopausal women with abnormal bleeding.



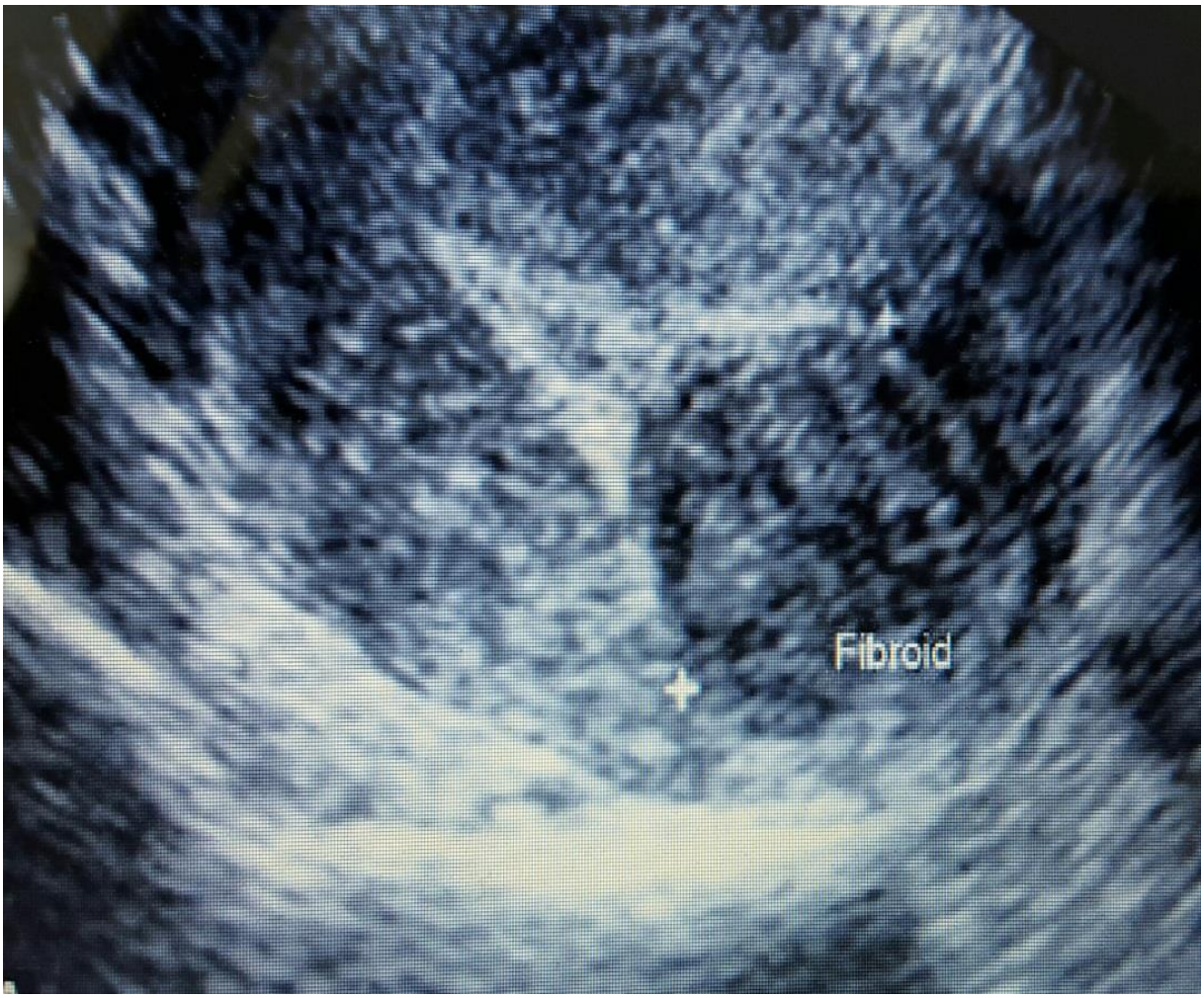
A (B.12) .TVS imageshowed endometrial hyperplasia in postmenopausal women her age is 49 years with abnormal vaginal bleeding



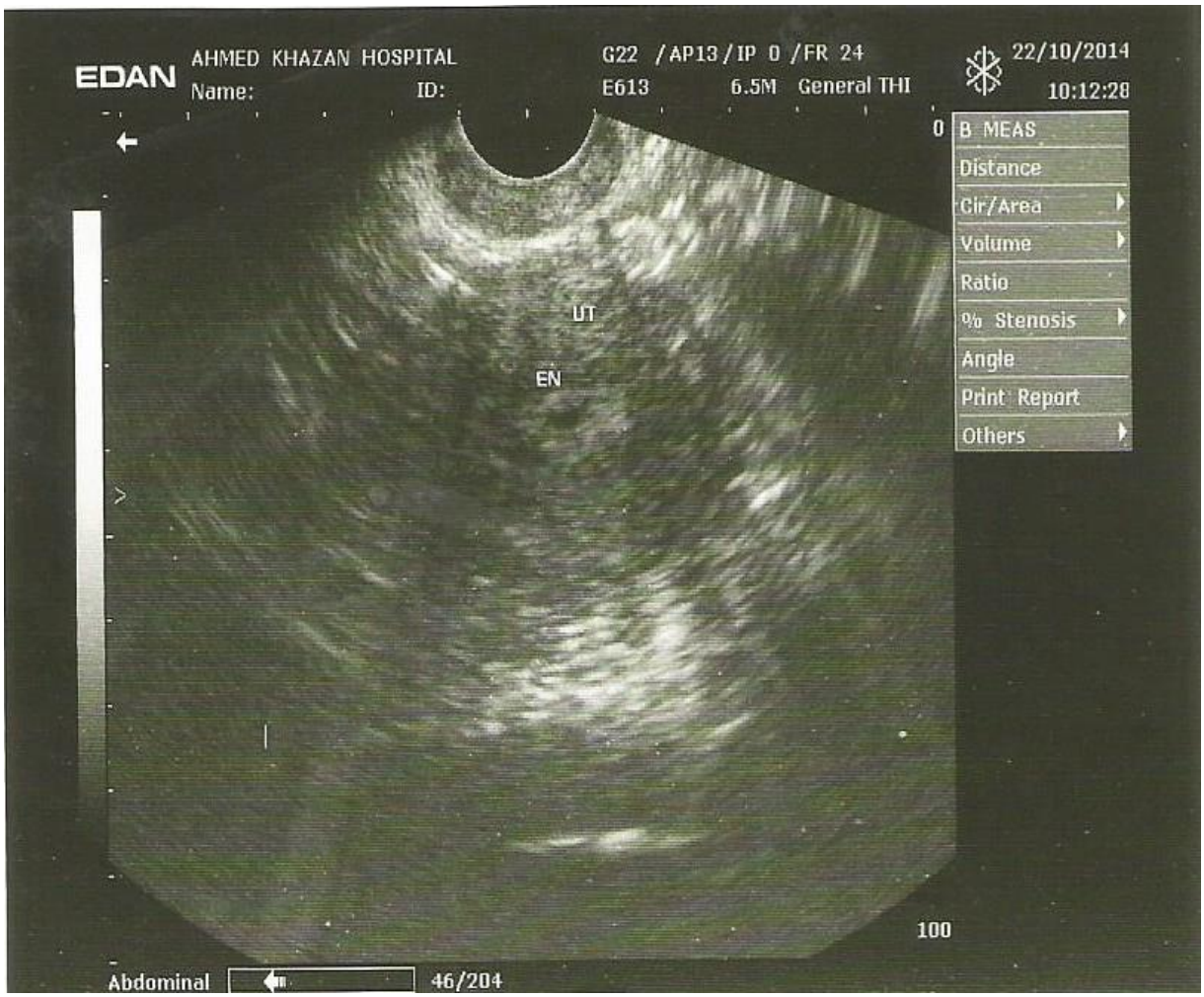
A (B.13) ultrasound image showed that endometrial polyp in postmenopausal women with age 63 years complain of vaginal bleeding.



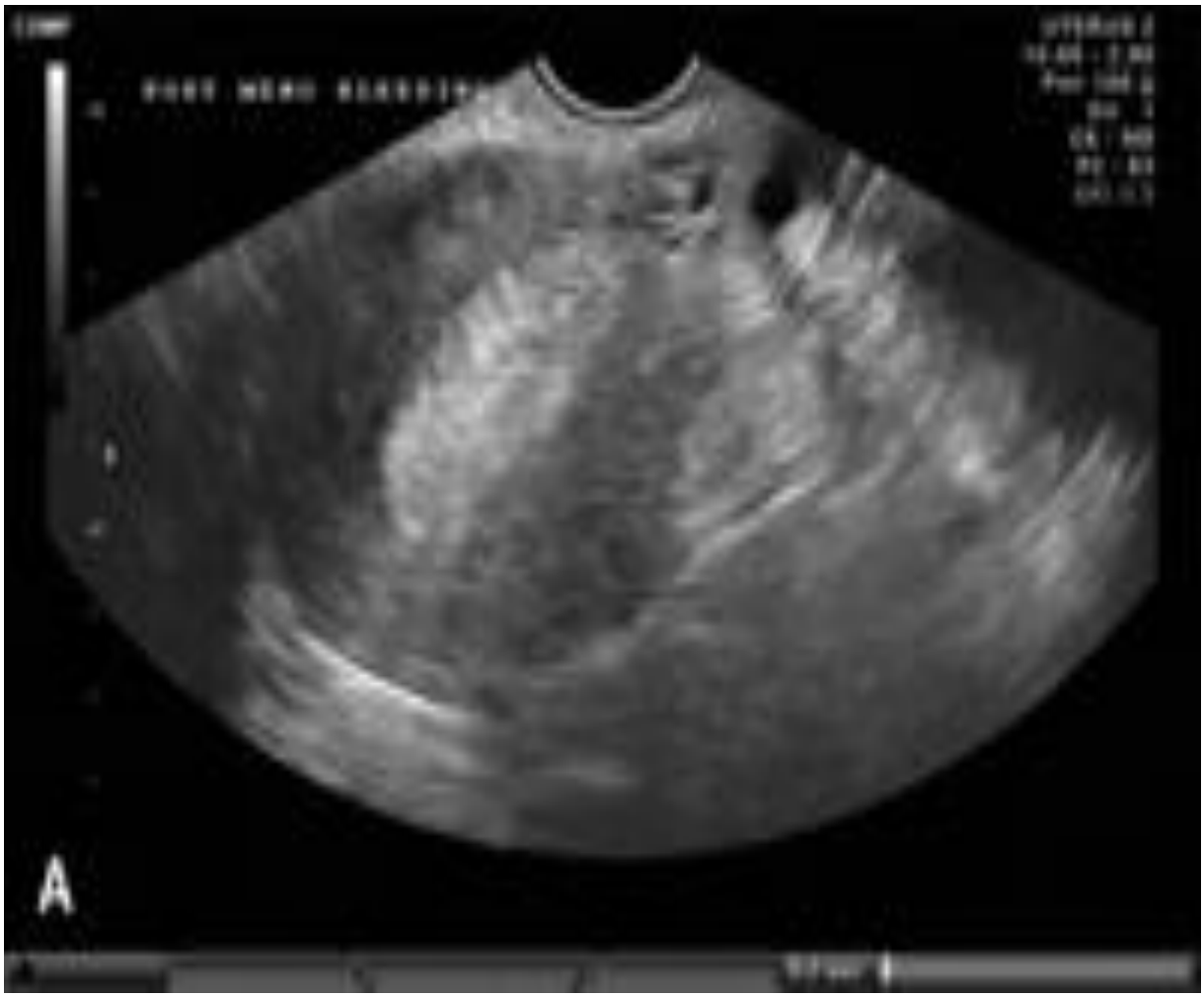
A (B.14) TVS showed regular thin endometrium with anterior leiomyoma in postmenopausal women (67years) with abnormal vaginal bleeding



A (B.15) TVS showed fundal fibroid protruding in endometrium inpostmenopusal women her age is (50 years)cames with vaginal bleeding



A (B.16) 70 years old women the u/s image showed small uterus with thin irregular endometrium &fluid collection seen in cavity (blood)



A (B.17) ultrasound image showed thickened endometrium (endomerium hyperplasia) in postmenopausal patient her age 54years old presented with bleeding.