

بسم الله الرحمن الرحيم



Sudan University of
Collage of

and Technology
studies



Role of ultrasonography in diagnosis causes of uterine bleeding

دور الموجات فوق الصوتيه في تشخيص اسباب النزيف الرحمي

***A thesis Submitted for Partial Fulfillment for
the Requirements of M.Sc Degree in Medical
Diagnostic Ultrasound***

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الآية

: قال تعالى

(وَلَا تَعْمَلُونَ مِنْ عَمَلٍ إِلَّا كُنَّا عَلَيْكُمْ شُهُودًا)

صدق الله العظيم

(سورة يونس (الآية: 61)

Dedication

For my father- smile of my life
For my mother - the first teacher
for me
For all who give me a hand in this
research

ACKNOWLEDGEMENT

I thank .Dr. Mona Ahmed Mohammed for her close contact supervision and guidance throughout this work

Abstract

This is practical study which was done during September -2015 to July 2016 and was carried out in Sudan-Khartoum state scanned in many hospitals include, (Aldayat, Alsaudi hospitals).The objective of this study was to assess the role of ultrasonography in diagnosis

causes of uterine bleeding in non pregnant patient .transabdominal ultrasound scan using 'Honda' Aloka and General Electric scanners with 3,5MHz probe was done for 60 patient of non pregnant women with abnormal uterine bleeding from different area, their ages between (20 -78) year, which data on configuration of easy question and ultrasound finding ,were collected .we found that, abnormal uterine bleeding, was most common in ages between (35 - 44) years. usually associated with varying symptoms, Menorrhagia was the most common symptom . and uterine fibroid was most common causes, (30)patient 50% followed by ovarian cyst (16)patient26.7% ,Endometrium hyperplasia(5) patient8.3% , uterine carcinoma (7)patient 11.7%.and lastly by poly cystic (2) patient 3.3%..Finally the researcher recommended the uses of ultrasound scanning as first line in diagnosing of abnormal uterine bleeding ,because it was fast exam ,non invasive ,low cost and is a good tool for diagnosis the causes of abnormal uterine bleeding, The menopausal women should be educated about post menopausal uterine bleeding for early complain to health centers for early diagnoses and treatment. Further studies should be carried out in this field on many aspects such as increasing the number of patients to show the relation between the uterine bleeding and other clinical symptoms, ultrasound finding ,and Doppler scan role in diagnosis causes of abnormal uterine bleeding.the government should update the ultrasound machines and increase the training institutes of ultrasound for increasing the sonologists skills and experiences.

ملخص الدراسة

هذه الدراسة عملية, أجريت خلال سبتمبر 2015 م إلى يوليو 2016 م طبقت بجمهورية السودان ولاية الخرطوم (مستشفيات السعودي و الدايات ام درمان). ناقشت الدراسة تقييم المسح بالموجات فوق الصوتية في تشخيص النزيف الرحمي الذي يظهر

عند النساء غير-الحمل , هنالك (60) مريضه تم اختيارهن عشوائيا و جميعهن لديهن نزيف رحمي كل المريضات فحصن بالموجات فوق الصوتية باستخدام ماسحات هوندا, الوكا وجنرال اليكتريك بطاقة مقدارها 3.5 ميغا هرتز.

هذه الدراسة وجدت أن النزيف الرحمي هو اكثر الاسباب شيوعا للدخول للمستشفيات وان معظم هؤلاء المرضى تتراوح اعمارهم بين 35- 44 سنة 31 مريض (51.7%) , وانهم يعانون من اعراض متباينة غزارة الطمث 28 مريض (46.6%) و عسر الطمث 20 مريض 40% وندرة الطمث 6 مريض 12% والام البطن 44 . %مريض 88% وسخانه البول 19 مريض 38

كما وجدت الدراسه ان اكثر اسباب النزيف الرحمي عندهم لحميه الرحم 30 مريض 50% وكيس المبيض 16 مريض 26% وسماكه بطانه الرحم 5 مريض 8% و تكيس المبايض 2 مريض 3% . وسرطان الرحم 7 مريض 11

كما وجدت الدراسه ان 40 مريض 66% من الحالات لم تصل سن الياس بينما 20 مريض 44% قد وصلت سن الياس . ووجدت ايضا ان 44 مريض (73%) لا يعانون من امراض سابقه بينما 3 مريض 5% بالسكري و 3 مرضي 5% من قصور درقي و 10 مرضي 16% . من فقر الدم

هذه الدراسة أوصت باستخدام الموجات فوق الصوتيه كوسيله اوليه في تشخيص اسباب النزيف الرحمي و بضرورة التثقيف

الصحي للنساء خصوصا فوق سن 40 بأسباب حدوث النزيف المهبلي بعد انقطاع الدورة وسرعة الذهاب لأقرب مستشفى لسرعة التشخيص و العلاج , كما تمت التوصية بتحسين الخدمات في أقسام أمراض النساء بالمستشفيات و تحديث الأجهزة و تدريب الكوادر للمساعدة في دقه التشخيص لهذا المرض كما أوصت بزيادة عدد أخصائيين أمراض النساء في المستشفيات التعليمية و ذلك لزيادة عدد حالات أمراض النساء وخاصة حالات النزيف ما بعد انقطاع الدورة الشهرية في هذه الفترة. وعمل دراسات اخري لنفس الموضوع في مجالات مختلفه مثل زيادة عدد المرضى وايضا استخدامات الدوبلار.

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CHAPTER ONE

CHAPTER ONE

Introduction 1-1

Menstruation is considered normal when uterine bleeding occurs every 21 to 35 days and is not excessive. The normal duration of menstrual bleeding is between two and seven days. Abnormal uterine bleeding occurs when either the frequency or quantity of uterine bleeding differs from that mentioned above or the woman has spotting or bleeding between her menstrual periods. Abnormal uterine bleeding may be caused by a variety of factors. The two most common causes are structural abnormalities of the reproductive system and ovulation disorders.. Some of the more common structural causes of abnormal uterine bleeding include benign (non-cancerous) lesions of the uterus such as polyps, fibroids (myomas), and adenomyosis (uterine thickening caused by endometrial tissue moving into the outer walls of the uterus) , Ultrasound imaging of the pelvis uses sound waves to produce pictures of the structures and organs in the lower abdomen and pelvis. There are three types of pelvic ultrasound: abdominal, vaginal (for women), and rectal (for men). These exams are frequently used to evaluate the reproductive and urinary systems . (Ultrasound n Obstetrics and Gynecology first edition)

1.2 Statements of the problem:-

Uttering bleeding disease becomes a significant challenge public health which may be due to benign or malignant pathology ,

1-3 Objective of the study :

Main objective 1-3-1

Role of ultrasonography in diagnosis causes of uterine bleeding in Gyne

Specific objectives 1-3-2

- o To identify the causes of abnormal uterine bleeding in Gyne.
- o To identify the most common causes of abnormal uterine bleeding in Gyne
- o To identify the most common age group in the study population
- o To identify the ultrasound findings of each cause.

- o To evaluate the role of ultrasound in demonstrating of abnormal uterine bleeding causes in Gyne.

1-4 Overview of the study:

This study consist of five chapters, chapter one contains introduction, hypothesis, objectives and overview of the study. chapter two deals with literature review which includes anatomy of the female pelvic organs ,physiology , pathology, imaging technique and previous study .chapter three contains methodology of the study, chapter four contains the results ,chapter five contain discussion , conclusion and recommendations, finally there are list of references and appendices which include ultrasound images .

CHAPTER TWO

CHAPTER TWO

2-1 Theoretical background

2-1-1 Anatomy:-

2-1-1-1 Mons pubis

The mons pubis is the rounded portion of the vulva where sexual hair development occurs at the time of puberty. this area may be described as directly anterosuperior to the pubic symphysis. (Snell 2014).

2-1-1-2 Labia

The labia majora are 2 large, longitudinal folds of adipose and fibrous tissue. They vary in size and distribution from female to female, The labia minora, also known as nymphae, are 2 small cutaneous folds that are found between the labia majora and the introitus or uterine vestibule. Anteriorly, the labia minora join to form the frenulum of the clitoris.

(Snell 2014).

2-1-1-3 Hymen

The hymen is a thin membrane found at the entrance to the uterine orifice. (Snell 2014).

2-1-1-4 Clitoris

The clitoris is an erectile structure found beneath the anterior joining of the labia minora.

(Snell 2014).

2-1-1-5 Vestibule and urethra

Between the clitoris and the uterine introitus (opening) is a triangular area known as the vestibule, which extends to the posterior fourchette. the vestibule is where the urethral (urinary) meatus is found, the urethra is composed of membranous connective tissue and links the urinary bladder to the vestibule externally. a female urethra ranges in length from 3.5 to 5.0 cm. (Snell 2014)

2-1-1-6 Skene and Bartholin glands

The Skene glands secrete lubrication at the opening of the urethra. The greater vestibular (Bartholin) glands are also responsible for secreting lubrication to the vagina, with openings just outside the hymen, bilaterally, at the posterior aspect of the vagina. each gland is small, similar in shape to a kidney bean. .

(Snell 2014).

2-1-1-7 Vestibular bulbs

Finally, the vestibular bulbs are 2 masses of erectile tissue that lie deep to the bulbocavernosus muscles bilaterally.

(Snell 2014).

2-1-1-8 Vagina

The vagina extends from the vulva externally to the uterine cervix internally. It is located within the pelvis, anterior to the rectum and posterior to the urinary bladder. the vagina lies at a 90° angle in relation to the uterus. the vagina is held in place by endopelvic fascia and ligaments.

(Sinnatamby 2011).

2-1-1-9 Uterus

The uterus is the inverted pear-shaped female reproductive organ that lies in the midline of the body, within the pelvis between the bladder and the rectum. It is thick-walled and muscular, with a lining that, during reproductive years, changes in response to hormone stimulation throughout a woman's monthly cycle. the uterus can be divided into 2 parts: the most inferior aspect is the cervix, and the bulk of the organ is called the body of the uterus (corpus uteri). Between these 2 is the isthmus, a short area of constriction. the body of the uterus is globe-shaped and is typically situated in an anteverted position, at a 90° angle to the vagina. the upper aspect of the body is dome-shaped and is called the fundus; it is typically the most muscular part of the uterus. the body of the uterus is responsible for holding a pregnancy, and strong uterine wall contractions help to expel the fetus during labor and delivery. the uterus is connected to its surrounding structures by a series of ligaments and connective tissue. the pelvic peritoneum is attached to the body and the cervix as the broad ligament, reflecting onto the bladder. the broad ligament attaches the uterus to the lateral pelvic side walls. within the broad base of the broad ligament, between its anterior and posterior laminae, connective tissue strands associated with the uterine and uterine vessels help to support the uterus and vagina. together, these strands are referred to as the cardinal ligament. the vasculature of the uterus is derived from the uterine arteries and veins. the uterine vessels arise from the anterior division of the

internal iliac, and branches of the uterine artery anastomose with the ovarian artery along the uterine tube. the nerve supply and lymphatic drainage of the uterus are complex. Lymphatic drainage is primarily to the lateral aortic, pelvic, and iliac nodes that surround the iliac vessels. the nerve supply is attained through the sympathetic nervous system (by way of the hypogastric and ovarian plexuses) and the parasympathetic nervous system (by way of the pelvic splanchnic nerves from the second through fourth sacral nerves).

(Sinnatamby 2011).

2-1-1-10 Cervix

The cervix is the inferior portion of the uterus, separating the body of the uterus from the vagina. the cervix is cylindrical in shape, with an endocervical canal located in the midline, allowing passage of semen into the uterus. the external opening into the vagina is termed the external os , and the internal opening into the endometrial cavity is termed the internal os. The internal os is the portion of a female cervix that dilates to allow delivery of the fetus during labor. the average length of the cervix is 3-5 cm.

(Sinnatamby 2011).

2-1-1-11 Uterine tubes

The uterine tubes (also referred to as oviducts or fallopian tubes) are uterine appendages located bilaterally at the superior portion of the cavity. their primary function is to transport sperm toward the egg, which is released by the ovary, and then to allow passage of the fertilized egg back to the uterus for implantation. the uterine tubes exit the uterus through an area known as the cornua and form a connection between the endometrial and peritoneal cavities. Each tube is approximately 10 cm in length and 1 cm in diameter and is situated within a portion of the broad ligament called the mesosalpinx. the distal portion of the uterine tube ends in an orientation encircling the ovary. the uterine tube has 3 parts. the first segment, closest to the uterus, is called the isthmus. The second segment is the ampulla, which becomes more dilated in diameter and is the typical place of fertilization. the final segment, furthest from the uterus, is the infundibulum. the infundibulum gives rise to the fimbriae, fingerlike

projections that are responsible for catching the egg that is released by the ovary.

(Sinnatamby 2011).

2-1-1-12 Ovaries

The ovaries are paired organs located on either side of the uterus within the mesovarium portion of the broad ligament below the uterine tubes. The ovaries are responsible for housing and releasing the ova, or eggs, necessary for reproduction. At birth, a female has approximately 1-2 million eggs, but only 300 of these eggs ever mature and are released for the purpose of fertilization. The ovaries are small and oval-shaped, exhibit a grayish color, and have an uneven surface. The actual size of an ovary depends on a woman's age and hormonal status; the ovaries are approximately 3-5 cm in length during childbearing years and become much smaller and atrophic once menopause occurs. A cross-section of the ovary reveals many cystic structures that vary in size. These structures represent ovarian follicles at different stages of development and degeneration. Several ligaments support the ovary. The ovarian ligament connects the uterus and ovary. The posterior portion of the broad ligament forms the mesovarium, which supports the ovary and houses the vascular supply. The suspensory ligament of the ovary (infundibular pelvic ligament), a peritoneal fold overlying the ovarian vessels, attaches the ovary to the pelvic side wall. Blood supply to the ovary is via the ovarian artery; both right and left ovarian arteries originate directly from the descending aorta at the level of the L2 vertebra. The ovarian artery and vein enter and exit the ovary at the hilum. The left ovarian vein drains into the left renal vein, and the right ovarian vein empties directly into the inferior vena cava. Nerve supply to the ovaries runs with the vasculature within the suspensory ligament of the ovary, entering the ovary at the hilum. Supply is through the ovarian, hypogastric, and aortic plexuses. Lymphatic drainage of the ovary is primarily to the lateral aortic nodes; however, the iliac nodes may also be involved.

(Sinnatamby 2011)

2-1-2 physiology:-

2-1-2-1 MENSTRUAL CYCLE

o The **menstrual cycle** includes the activity of the hormones of the ovaries and anterior pituitary gland and the resultant changes in the ovaries (ovarian cycle) and uterus (uterine cycle). These are all incorporated into , which may look complicated at first, but refer to it as you read the following. Notice first the four hormones involved: **FSH** and **LH** from the anterior pituitary gland, **estrogen** from the ovarian follicle, and **progesterone** from the corpus luteum. The fluctuations of these hormones are shown as they would occur in an average 28-day cycle. A cycle may be described in terms of three phases: menstrual phase, follicular phase, and luteal phase.

(essential anatomy & physiology 4 edition)

o **Menstrual phase**—The loss of the functional layer of the endometrium is called **menstruation** or the menses. Although this is actually the end of a menstrual cycle, the onset of menstruation is easily pinpointed and is, therefore, a useful starting point. Menstruation may last 2 to 8 days, with an average of 3 to 6 days. At this time, secretion of FSH is increasing, and several ovarian follicles begin to develop.

(essential anatomy & physiology 4 edition)

o **Follicular phase**—FSH stimulates growth of ovarian follicles and secretion of estrogen by the follicle cells. The secretion of LH is also increasing, but more

slowly. FSH and estrogen promote the growth and maturation of the ovum, and estrogen stimulates the growth of blood vessels in the endometrium to regenerate the functional layer. This phase ends with ovulation, when a sharp increase in LH causes rupture of a mature ovarian follicle. (essential anatomy & physiology 4 edition)

- o **Luteal phase**—Under the influence of LH, the ruptured follicle becomes the corpus luteum and begins to secrete progesterone as well as estrogen. Progesterone stimulates further growth of blood vessels in the functional layer of the Endometrium and promotes the storage of nutrients such as glycogen. As progesterone secretion increases, LH secretion decreases, and if the ovum is not fertilized, the secretion of progesterone also begins to decrease. Without progesterone, the endometrium cannot be maintained and begins to slough off in menstruation. FSH secretion begins to increase (as estrogen and progesterone decrease), and the cycle begins again. Also secreted by the corpus luteum during a cycle are the hormones inhibin and relaxin. Inhibin inhibits the secretion of FSH, and perhaps LH as well, from the anterior pituitary gland. Relaxin is believed to inhibit contractions of the myometrium (as does progesterone), which would help make implantation of the early embryo successful. The 28-day cycle shown in is average. Women may have cycles of anywhere from 23 to 35 days, the normal range. Women who engage in strenuous exercise over prolonged periods of time may experience amenorrhea, that is, cessation of menses. This seems to be related to reduction of body fat. Apparently the reproductive cycle ceases if a woman does not have sufficient reserves of energy for herself and a developing fetus. The exact mechanism by which this happens is not completely understood at present. Amenorrhea may also accompany states of physical or emotional stress, anorexia nervosa, or various endocrine disorders. (essential anatomy & physiology 4 edition)

2-1-3 Pathology:-

2-1-3 -1 Endometrial polyps

Are benign nodular protrusions of the endometrial surface, and one of the entities included in a differential of endometrial thickening. Endometrial polyps can either be sessile or pedunculated. They can often be suggested on ultrasound or MRI studies, but may require sonohysterography or direct visualisation for confirmation.

((Alfred Abohamed 2007)).

2-1-3 -2 Endometrial carcinoma

Is generally considered the most common gynaecological malignancy. It frequently presents with uterine bleeding and both ultrasound and pelvic MRI are useful modalities for evaluation. Endometrial carcinoma is divided to two subtypes:

- Type I (80%): arising in setting of unopposed hyperestrogenism and endometrial hyperplasia
- Type II (20%): arising in the setting of endometrial atrophy, in a female between 65 to 75 years old, and endometrial intraepithelial carcinoma.
- ((Alfred Abohamed 2007)).

2-1-3 -3 Endometrial hyperplasia (EH)

Refers to an increased proliferation of the endometrial glands relative to the stroma. One of the main concerns is the potential malignant transformation of the endometrial hyperplasia to the endometrial carcinoma

((Alfred Abohamed 2007)).

2-1-3 -4 **Endometritis**

Endometritis is inflammation of the endometrial lining of the uterus. In addition to the endometrium, inflammation may involve the myometrium and, occasionally, the parametrium. Endometritis can be divided into pregnancy-related endometritis and

endometritis unrelated to pregnancy. When the condition is unrelated to pregnancy, it is referred to as pelvic inflammatory disease (PID). Endometritis is often associated with inflammation of the fallopian tubes (salpingitis), ovaries (oophoritis), and pelvic peritoneum (pelvic peritonitis).

((Alfred Abohamed 2007)).

2-1-3 -5 **Endometrioma / Endometriosis**

An ovarian endometrioma is a cystic mass arising from ectopic endometrial tissue within the ovary. It contains thick, brown, tar-like fluid, which may be referred to as a "chocolate cyst." Endometriomas are often densely adherent to surrounding structures, such as the peritoneum, fallopian tubes, and bowel.

(Alfred Abohamed 2007).

2.1.3.6 **Fibroids**

A uterine fibroid (known medically as a *leiomyoma* or *myoma*) is a noncancerous (benign) growth of smooth muscle and connective tissue. Fibroids can range in size from as small as a pinhead to larger than a melon. Fibroids have been reported weighing more than 20 pounds.

Fibroids originate from the thick wall of the uterus and are categorized by where they grow:

- *Intramural fibroids* grow within the middle and thickest layer of the uterus (called the *myometrium*).
- *Subserosal fibroids* grow out from the thin outer fibrous layer of the uterus (called the *serosa*). Subserosal can be either stalk-like (*pedunculated*) or broad-based (*sessile*).

- *Submucosal fibroids* grow from the uterine wall toward and into the inner lining of the uterus (the *endometrium*). Submucosal fibroids can also be stalk-like or broad-based

(Alfred Abohamed 2007).

2-1-3 -7 **Nabothian Cyst**

- Multiple cysts within the cervix

((Alfred Abohamed 2007)).

2-1-3 -8 **Cervical Cancer**

- typically Squamous cell carcinoma SCC
- cervical stenosis with endometrial fluid collection

- parametrial invasion
 - irregular, poorly defined margins of lateral cervix
 ((Alfred Abohamed 2007)).

Cervical Cancer Staging

- Stage 1 - confined to cervix
 - Stage 2 - beyond cervix, but not to pelvic sidewall or lower 1/3 of vagina , 2A - uterine invasion (upper 2/3) .2B - parametrial invasion
 - Stage 3 - extends to lower 1/3 of vagina , 3A - lower 1/3 of vagina , 3B - pelvic sidewall
 - Stage 4 - , 4A - bladder or rectal invasion , 4B - distant mets (typically lung and liver).
- Alfred Abohamed (2007).

2-1-3-9 Adenomyosis

Form of endometriosis where there is aberrant endometrial tissue in the myometrium ,Diffuse or focal , US - Sonographic appearance overlaps w/ fibroids, but presence of small cysts or hypoechoic areas or variation during menstrual cycle is suggestive of adenomyosis, Irregular, myometrial, cystic spaces predominantly involving the posterior uterine wall, an enlarged uterus with a widened posterior wall (see Image 1), an eccentric endometrial cavity, and decreased uterine echogenicity without lobulations, contour abnormality, or mass effects (which is more commonly seen with leiomyomas). Sonograms may also show an ill-defined margin between the normal myometrium and the abnormal myometrium, as well as an elliptically shaped myometrial abnormality.

(Alfred Abohamed 2007).

2-1-3 -10 Benign Ovarian Neoplasm's

- mucinous or serous cystadenomas, Brenner tumors
- granulosa cell tumors, fibromas, thecomas (secrete estrogens -> endometrial hyperplasia)
- Sertoli-Leydig cell tumors (secrete androgens -> virilization)
- cannot differentiate from malignant neoplasms

- complex lesions with septations and solid tumor nodules
(Alfred Abohamed 2007).

2-1-3- **11 Ovarian Teratomas**

most common benign ovarian neoplasm , classic mimicker , rarely malignant , at risk for torsion , complex, partially cystic, w/ echogenic areas that may shadow , dermoid plug = Rokitansky nodule , presence of struma ovarii can (rarely) cause thyrotoxicosis.

(Alfred Abohamed 2007).

2-1-3-12 **Cystic Adnexal Mass**

- o Hydrosalpinx.
- o cystic teratoma.
- o corpus luteum cyst.
- o benign or malignant ovarian tumor.

(Alfred Abohamed 2007).

2-1-3 -13 **Polycystic Ovaries**

This include enlarged ovaries , echogenic stroma , cysts in periphery (>5 cysts over 5mm in size).

(callen 2016).

2-1-3 -14 **Stein - Leventhal**

PCO, obesity, infertility / amenorrhea, and hirsutism .

(callen 2016).

2-1-3 -15 **Hemorrhagic Cysts**

usually result from haemorrhage into a corpus luteum or other functional cyst. Radiographic features are variable depending on the age of the haemorrhage. They typically resolve within eight weeks., difrential diagnoses include endometrioma, hemorrhagic corpus luteum cyst, dermoid, follicular cyst .

(Alfred Abohamed 2007).

2-1-3 -16 **Hydrosalpinx**

is a descriptive term and refers to a fluid filled dilatation of the fallopian tube. Caused by PID, endometriosis, prior instrumentation, leading to adhesions that obstruct the peritoneal opening of the tube , infected = pyosalpinx .

(Alfred Abohamed 2007).

2-1-3 -17 **Tubo-Ovarian Abscess**

refers to a collection of pus in the tube Severe form of PID, usually bilateral , complex, multiloculated adnexal

mass w/ echoes from debris/pus , may have thick septations.

(Alfred Abohamed 2007).

2-1-3-18 Endometrial Fluid

Fluid in the endometrial cavity can result from a number of causes if excessive and associated with distension.

There are essentially three types of fluid:

- hydrometra: simple fluid
- haematometra: haemorrhagic content / clot
- pyometra: pus

caused by cervical stenosis , cervical carcinoma , hydrometrocolpos and endometritis .

(Alfred Abohamed 2007).

2.1.3.19 Pelvic Free Fluid

free fluid to accumulate The cul-de-sac, also known as pouch of Douglas or rectouterine pouch, Separate into Gynecologic and non-Gynecologic etiologies.

(Alfred Abohamed 2007).

2-1-4 physics

In physics the term “ultrasound” applies to all acoustic energy with a frequency above human hearing (20,000 hertz or 20 kilohertz). Typical diagnostic sonographic scanners operate in the frequency range of 2 to 18 megahertz (Ultrasound Teaching Manual 2nd edition)

2-1-4 -1 From sound to image

In ultrasound, the following events happen:

- o The ultrasound machine transmits high-frequency (1 to 5 megahertz) sound pulses into your body using a probe.

- o The sound waves travel into your body and hit a boundary between tissues (e.g. between fluid and soft tissue, soft tissue and bone).
- o Some of the sound waves get [reflected](#) back to the probe, while some travel on further until they reach another boundary and get reflected.
- o The reflected waves are picked up by the probe and relayed to the machine.
- o The machine calculates the distance from the probe to the tissue or organ (boundaries) using the speed of sound in tissue (5,005 ft/s or 1,540 m/s) and the time of the each echo's return (usually on the order of millionths of a second).
- o The machine displays the distances and intensities of the echoes on the screen, forming a two dimensional image .
(Ultrasound Teaching Manual 2nd edition)

2-1-4 -2 Diagnostic applications

abdominal, cardiac, maternity, gynecological, urological and cerebrovascular examination, breast examination, and small pieces of tissue as well as in pediatric and operational review. (Ultrasound Teaching Manual 2nd edition)

modes of ultrasound 2-1-4-3

Four different modes of ultrasound are used in medical imaging These are:

- o A-mode: A-mode is the simplest type of ultrasound. A single transducer scans a line through the body with the echoes plotted on screen as a function of depth. Therapeutic ultrasound aimed at a specific tumor or calculus is also A-mode, to allow for pinpoint accurate focus of the destructive wave energy.
- o B-mode: In B-mode ultrasound, a linear array of transducers simultaneously scans a plane through the body that can be viewed as a two-dimensional image on screen.
- o M-mode: M stands for motion. In m-mode a rapid sequence of B-mode scans whose images follow each other in sequence on screen enables doctors to see

and measure range of motion, as the organ boundaries that produce reflections move relative to the probe.

- o Doppler mode: This mode makes use of the Doppler effect in measuring and visualizing blood flow. Doppler sonography play important role in medicine (Ultrasound Teaching Manual 2nd edition)

2-1-5 imaging technique

Pelvic ultrasound can be done three ways: transabdominal, transrectal, and transvaginal. (Ultrasound Teaching Manual 2nd edition)

2-1-5 -1 Transabdominal ultrasound

A small handheld device called a transducer is passed back and forth over the lower belly. A transabdominal ultrasound is commonly done in women to look for large uterine fibroids or other problems. (Ultrasound Teaching Manual 2nd edition)

2-1-5 -2 Transrectal ultrasound.

The transducer is shaped to fit into the rectum. A transrectal ultrasound may be done to check for problems in men or women. It is the most common test to look at the male pelvic organs, such as the prostate and seminal vesicles. Sometimes, a small sample of tissue (biopsy) may be taken with small tools inserted through the rectum during a transrectal ultrasound. (Ultrasound Teaching Manual 2nd edition)

2-1-5 -3 Transvaginal ultrasound.

The transducer is shaped to fit into a woman's vagina . A woman may have both transabdominal and transvaginal ultrasounds to look at the whole pelvic area. A transvaginal ultrasound is done to look for problems with fertility or pregnancy. In rare cases, a hysterosonogram is done to look at the inside of the uterus by filling the uterus with fluid during a transvaginal ultrasound. Sometimes, a small sample of tissue (biopsy) may be taken with small tools inserted through the vagina during a transvaginal ultrasound. (Ultrasound Teaching Manual 2nd edition)

2-1-2 Previous studies

The study included 100 cases of uterine bleeding was done by trans abdominal ultrasonund, conclude There is an age specific association of Abnormal uterine bleeding with increased incidence in perimenopausal age group (Makaju 2013)

The study included 500 cases of atypical uterine bleeding was done by transabdominal ultrasound, conclude abnormal uterine bleeding occurs secondary to a wide variety of functional and structural abnormalities, Menorrhagia is a common symptom and the most likely etiology relates to the patient's age ([Sherwani](#) 2014)

The study included 103 cases of uterine bleeding done by Transvaginal ultrasound ,conclude AUB, most of the patients were between 40 and 45 years of age (67.97%) , menorrhagia was the dominant clinical presentation and Uterine fibroid was the leading cause of AUB ([Talukdar](#) APRIL 2016)

study conducted in 50 patients, observed that the majority of patients were admitted due to menorrhagia, and most of them were peri-menopausal women. Fibroid uterus is the most common cause in the study population, other than cyst and adenomyosis (KUMAR 2015)

CHAPTER THREE

CHAPTER THREE

Material and methods

3-1 material

3-1-1 Patients and sampling:

The sonographic scanning of the 60 patient in the study with abnormal uterine bleeding came to ultrasound department for check up

Criteria

Inclusion Criteria:

- Abnormal uterine bleeding (menorrhagia/menometrorrhagia/metrorrhagia)

Exclusion Criteria:

- Pregnant causes of abnormal uterine bleeding
- Dysfunctional uterine bleeding
- Systemic diseases that may cause coagulopathies: liver disease, pituitary/ hypothalamus diseases

3-1-2 Area and duration of the study:

This study was started in July 2015 and continued up September 2016. The study was carried out in Khartoum state. the hospital which I had done this research include Aldayat hospital and Alsudi hospital.

3-1-3 Equipment used:

Aloka ,Honda andGeneral Electric

3-2 methods

3-2-1 Technique used:

3-2-1-1 Trans abdominal U/S scanning:

3-2-1-2 Patient Preparations:

The bladder must be full enough, gives patient 4 to 5 glasses of fluid and examined after one hour, if the patient cannot retain urine give his lasex (20 mg/ I V or tabs). this procedure is restricted to patient without any cardiac problem .

3-2-1-3 Position of the patient:

The patient should lie supine, the patient should be relaxed, lying comfortably and breathing quietly, lubricates the lower abdomen with coupling agent. hair

anywhere on the abdomen will trap air bubbles so apply coupling agent generously.

3-2-1-4 Scanning technique:

Start with a transverse scans from the symphysis pubis up wards to the umbilicus and we must be angle the probe sharply down word until the uterus appears in the center of the screen and endometrial line appear , adjusted the gain of the image and freeze it, here I measured the width of the uterus. then sagital scane from the symphysis pubis up wards to the umbilicus and we must be angle the probe sharply down word until the uterus appears in the center of the screen and endometrial line appear , adjusted the gain of the image and freeze it, here I measured the length , AP diameter and endometrial thickness .then I scan from one side to another to evaluate the uterine shape, if it is normal or abnormal, also evaluate the uterine texture, and texture and size of mass if present .

3-2-2 Data analysis:

The data analyzed using (Statistical Package for the Social Sciences)program. the data was coded and analyzed using statistical computed .

Chapter four

Chapter four Result

4-1 Result

Table: (4-1) Age distribution of study population

Overall n=60 (%)	Age group % (n)
2 (3.3)	2024
7(11.7)	2534
31 (51.7)	3544
20 (33.3)	>45

Figure (4-1) Age distribution of study population

Table: (4-2) Reason for admission in the study population

Patient n=60 (%)	Reason for admission
28 (46.6)	Menorrhagia
6 (10)	Oligomenorrhea
20 (33.3)	Dysmenorrhea
19 (31.6)	Burning micturition
44 (73.3)	Abdominal pain

Figure(4-2): Reason for admission in the study population

Table: (4-3): Menopause status in the study population

Overall n=60 (%)	Menopause
20 (33.3)	Attained
40 (66.7)	Not attained

Figure(4-3):: Menopause status in the study population

Table: (4-4): correlation between the age group and different causes

Uteri ne CA (%)	hype rplas ia (%)	Poly cyst ic (%)	Ovari an cyst (%)	Fibro id uteru s (%)	Overall n=60 (%)	Age group % (n)
0 (0)	0 (0)	0 (0)	2 (3.3)	0 (0)	2 (3.3)	2024
0 (0)	0 (0)	1 (1.6)	4 (6.7)	2 (3.3)	7(11.7)	2534
0(0)	1(1.7)	1 (1.7)	6 (10)	16 (26.7)	31 (51.7)	3544
7 (11.7)	4 (6.7)	0 (0)	4 (6.7)	12 (20)	20 (33,3)	>45
7 (11.7)	5 (8.3)	2 (3.3)	16 (26.7)	30 (50)	100%	Total

Figure: (4-4): correlation between the age group ((vertical axis) and different causes(short axis

CHAPTER FIVE

CHAPTER FIVE

5-1 DISCUSSION

- This study had been conducted in Khartoum state hospitals, to evaluate abnormal uterine bleeding using trans abdominal ultrasonography, there were 60 cases in this study, all cases were suffering from uterine bleeding and their age ranged between 20-78 years old .
 - in the study population, (2) patients 4% were between the ages (20 -22) ,(8) patients 16% between the age (25 - 34), (21) patients 42% between the age (35-44), and (19) patients 38% were above 45 years, this indicate The largest group with abnormal uterine bleeding came for scanning age was between (35 - 44)year. Similar result were achieved by (Makaju 2013) Table(4-1).
- The patients admitted to the study site with varying symptoms like menorrhagia (28)patient56% , dysmenorrhea (20)patient40% , oligomenorrhea (6)patient 12%, abdominal pain (44)patient 88% and burning micturition (19)patient 38%, this indicate menorrhagia was the dominant clinical presentation , Similar results were achieved by ([Talukdar 2016](#)) Table(4-2).
- the patient menstrual status of the study population was categorized as pre-menopause, and menopause. The category of menopause 4% (2) which includes the patient whose menstruation was stopped this indicate the majority of patients with abnormal uterine bleeding are pre-menopause. Similar results were achieved by (KUMAR 2015) (Table 4-3).
- in the study population patients were thoroughly screened to identify the problems. The results revealed that (30)patient50% of the study population had fibroid uterus, (16)patient 26.7% with ovarian cyst, (2)patient 3.3% with poly cystic , (5) patient 8.3% with hyper plasia , (7)patient 11.7% with uterine carcinoma. This indicate most common cause of abnormal uterine bleed is fibroid . , Similar

results were achieved by (KUMAR 2015) and ([Talukdar 2016](#)) Table(4-4)

Conclusion

5-2 Conclusion

most of the patients were between (35 - 44) years of age. Menorrhagia was the most common symptoms , increase in premenopausal women more than menopausal and fibroid uterus was most common causes (30)patient 50% followed by ovarian cyst (16)patient26.7% ,Endometrium hyperplasia(5) patient8.3%.,uterine carcinoma(7)patient 11.7%.and lastly by poly cystic (2) patient 3.3%.

Recommendation

5-3 Recommendation:

The researcher recommended the uses of U/S scanning as first line in diagnosing of abnormal uterine bleeding ,because it was fast exam ,non invasive ,low cost and is a good diagnostic tool for diagnosis of abnormal uterine bleeding causes, The menopausal women should be educated about post menopausal uterine bleeding for early complain to health centers for early diagnoses and treatment .Further studies should be carried out in this field on many aspects such as increasing the number of patients to show the relation between the post menopausal uterine bleeding and other clinical symptoms, ultrasound finding .and the Doppler scan role in diagnosis causes of abnormal uterine bleeding

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Appendix 1
Data collection sheet
Sudan university of science and technology
Post graduate study Data collection sheet

Title -----

Patient adage -----

Past medical history **no** ----- **yes** -----

no	yes	Clinical finding
		Oligomenorrhea
		Menorrhagia
		Dysmenorrhea
		Burning micturition
		Pelvic pain

Ultrasound finding

Uterine size
 normal ----- enlarged ----- small-----

Uterine mass
 no ----- yes -----

Size -----

Texture -----

-
Ovaries

Normal no----- yes -----
 Abnormal -----

 Pouch of Douglas free ----- fluid -----
 collection -----
 Lt & RT adenixal mass
 no ----- yes -----
 Size -----
 Texture -----

 Endometrium normal
 yes ----- no-----
 Abnormal -----

 Other ultrasound finding -----

Appendix 2 Images of the researcher



Image (1) transabdominal u/s for 45 y women with endometrial hyperplasia



Image (2) transabdominal u/s for 46 y women with endometrial hyper plasia

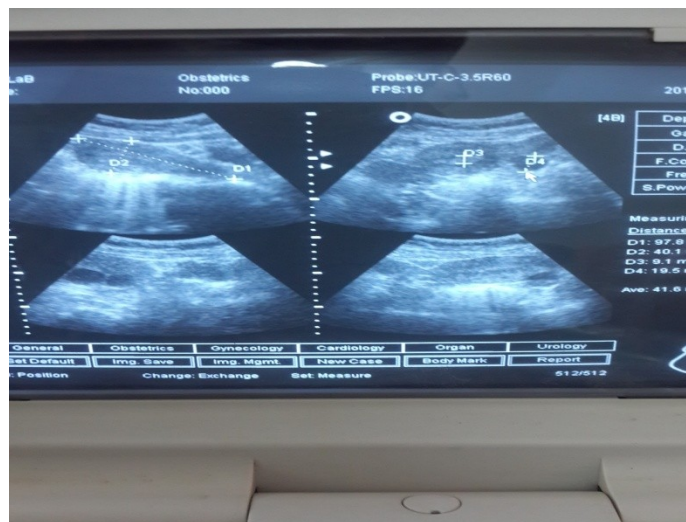


Image (3) Transabdominal u/s for 43y women with uterine bleeding show endometrial hyperplasia with cystic mass in the right adnexiae .

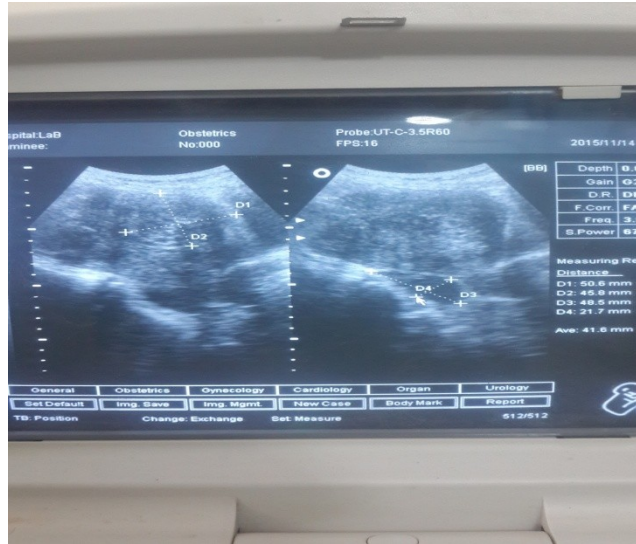


Image (4) transabdominal u/s show 56 y women with uterine carcinoma .

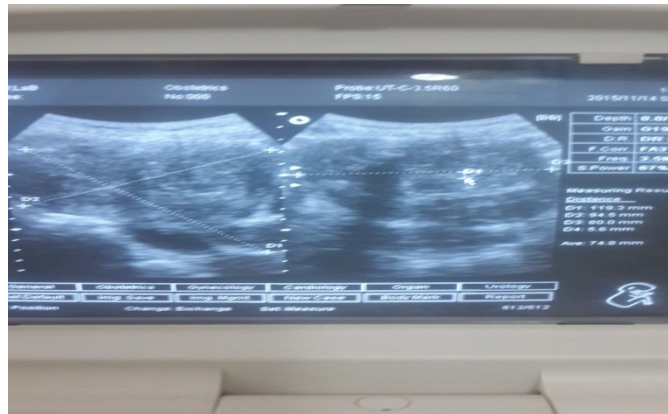


Image (5) transe abdominal u/s for 57 y women with uterine carcinoma and fluid in cul de sac.

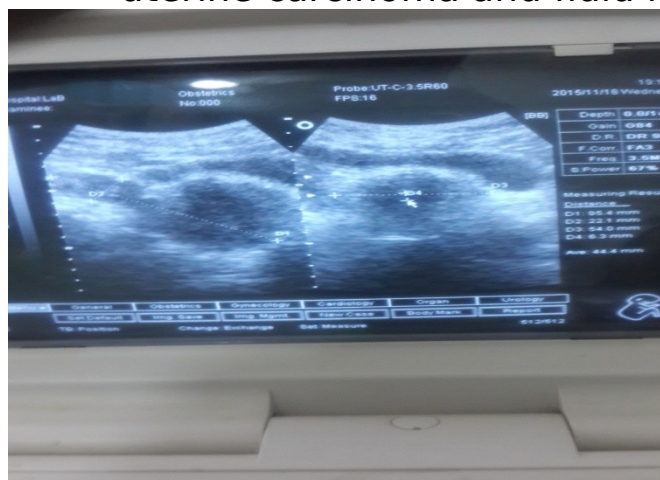


Image (6) transabdominal u/s for 59 y women with cervical carcinoma.



Image (7) transabdominal u/s for 45 y women with uterine fibroid



Image (8) transabdominal u/s for 44 y women with calcified uterine fibroid and fluid in cul de sac



Image (9) transabdominal u/s for 45 y women with uterine fibroid.



Image (10) transabdominal u/s for 46 y women with calcified uterine fibroid and fluid in cul de sac.



Image (11) transabdominal u/s for 34 y women with RT ovarian cyst



Image (12) Transvaginal u/s for 34 y women with polycystic



Image (13) transabdominal u/s for 46 y women with subserosal uterine fibroid



Image (14) transabdominal u/s for 50 y women with cervical mass