Chapter One
Introduction

1.1 Introduction

Ultrasound is the term used to describe sound of frequencies above 20 000 Hertz (Hz), beyond the range of human hearing. Frequencies of 1–30 megahertz (MHz) are typical for diagnostic ultrasound. Diagnostic ultrasound imaging depends on the computerized analysis of reflected ultrasound waves, which non-invasively build up fine images of internal body structures. The resolution attainable is higher with shorter wavelengths, with the wavelength being inversely proportional to the frequency. However, the use of high frequencies is limited by their greater attenuation (loss of signal strength) in tissue and thus shorter depth of penetration. For this reason, different ranges of frequency are used for examination of different parts of the body: 3–5 MHz for abdominal areas , 5–10 MHz for small and superficial parts and 10–30 MHz for the skin or the eyes.[Harald Lutz2011].

To form a B-mode image, a source of ultrasound, the transducer, is placed in contact with the skin and short bursts or pulses of ultrasound are sent into the patient. These are directed along narrow beam-shaped paths. As the pulses travel into the tissues of the body, they are reflected and scattered, generating echoes, some of which travel back to the transducer, where they are detected. These echoes are used to form the image. To display each echo in a position corresponding to that of the interface or feature (known as a target) that caused it, the B-mode system needs two pieces of information. These are the range (distance) of the target from the transducer and the

direction of the target from the active part of the transducer, i.e. the position and orientation of the ultrasound beam. [PeterH.KevenM.AbigailT2010]

Pelvic pain is pain located in pelvis or lower abdomen .pelvic pain is associated with wide range of condition involving the reproductive, gastrointestinal ,genitourinary ,and musculoskeletal systems. But we concern with gynecological causes.[Trish Chudleigh2004]

Pelvic pain can be characterized as acute, chronic ,or recurrent, acute pelvic pain is define as pain lasting for less than 3months ,while chronic pain generally lasts longer than 3to 6 months. This time line is arbitrary ,and patient with cyclic episodic pain may be best classified as having recurrent pelvic pain rather than acute or chronic .pain with identifiable specific cause is termed organic pain ,while pain without a clearly identifiable cause that is exacerbated by psychosocial factors is termed functional pain. Acutepelvicpain is likely to be associated with an identifiable process ,detail sexual history is paramount in the evaluation of acute pelvic pain as PID and ectopic pregnancy are major considerations ,also adnexal torsion , ruptured ovarian cyst and tubo-ovarian abscess can cause pelvic pain but less common .chronic pelvic pain commonly causes by Endomitriosis, Gynecologicalmalignancy,PIDandadnexalcysts.[Trish Chudleigh2004] .

1-2 Problemofthestudy:

pelvic pain is a common complaint in women and usually diagnosed by laboratory investigations which does not describe all causes ideally, so we need accurate, safe and cheep tool for detection of gynecological causes using ultrasound.

1-3 Objectives:

1-3-1 General objectives:

The main purpose of this study is to identify the adnexal causes of pelvic pain in non pregnant women.

1-4-2Specificobjectives:

To evaluate the role of ultrasound in early detection of pelvic pain causes.

To differentiate between pelvic pain causes using ultrasound.

To demonstrate ultrasound findings in any cause of pelvic pain.

Chapter two

Literature review

2-1 Anatomy of uterus:

The uterus is a hollow, pear shaped organ with thick muscular walls. In the young nulliparous adult, it measures 3 in. (8 cm) long, 2 in. (5 cm) wide, and 1 in. (2.5 cm) thick. It is divided into the fundus, body, and cervix .The fundus is the part of the uterus that lies above the entrance of the uterine tubes. The body is the part of the uterus that lies below the entrance of the uterine tubes. The cervix is the narrow part of the uterus. It pierces the anterior wall of the vagina and is divided into the supra vaginal and vaginal parts of the cervix (Snell, 2012).

2-1-1 Relations of the uterus:

Anteriorly: The body of the uterus is related anteriorly to the uterovesical pouch and the superior surface of the bladder. The supravaginal cervix is related to the superior surface of the bladder. The vaginal cervix is related to the anterior fornix of the vagina.

Posteriorly: The body of the uterus is related posteriorly to the rectouterine pouch (pouch of Douglas) with coils of ileum or sigmoid colon within it.

Laterally: The body of the uterus is related laterally to the broad ligament and the uterine artery and vein. The supravaginal cervix is related to the ureter as it passes forward to enter the bladder. The vaginal cervix is related to the lateral fornix of the vagina. The uterine tubes enter the superolateral angles of the uterus, and the round ligaments of the ovary and of the uterus are attached to the uterine wall just below this level (Snell, 2012).

2-1-2 Function of the uterus:

The uterus serves as a site for the reception, retention, and nutrition of the fertilized ovum (Snell, 2012).

2-1-3 Positions of the Uterus:

In most women, the long axis of the uterus is bent forward on the long axis of the vagina. This position is referred to as anteversion of the uterus. Furthermore, the long axis of the body of the uterus is bent forward at the level of the internal os with the long axis of the cervix. This position is termed anteflexion of the uterus. Thus, in the erect position and with the bladder empty, the uterus lies in an almost horizontal plane. In some women, the fundus and body of the uterus are bent backward on the vagina so that they lie in the rectouterine pouch (pouch of Douglas). In this situation, the uterus is said to be retroverted. If the body of the uterus is, in addition, bent backward on the cervix, it is said to be retroflexed (Snell, 2012).

2-1-4 Blood Supply of the uterus:

Arterial supply to the uterus is mainly from the uterine artery, a branch of the internal iliac artery. It reaches the uterus by running medially in the base of the broad ligament. It crosses above the ureter at right angles and reaches the cervix at the level of the internal os. The artery then ascends along the lateral margin of the uterus within the broad ligament and ends by anastomosing with the ovarian artery, which also assists in supplying the uterus. The uterine artery gives off a small descending branch that supplies the cervix and the vagina.

Uterine vein follows the artery and drains into the internal iliac vein. Lymph Drainage: The lymph vessels from the fundus of the uterus accompany the ovarian artery and drain into the para-aortic nodes at the level of the first lumbar vertebra. The vessels from the body and cervix drain into the internal

and external iliac lymph nodes. A few lymph vessels follow the round ligament of the uterus through the inguinal canal and drain into the superficial inguinal lymph nodes (s .Snell, 2012).

2-1-5 Nerve Supply of the uterus:

Sympathetic and parasympathetic nerves from branches of the inferior hypogastric plexuses (Snell., 2012).

2-1-6 Supports of the Uterus:

The uterus is supported mainly by the tone of the levatoresani muscles and the condensations of pelvic fascia, which form three important ligaments:The Transverse Cervical, Pubocervical, and Sacrocervical Ligaments (Snell., 2012).

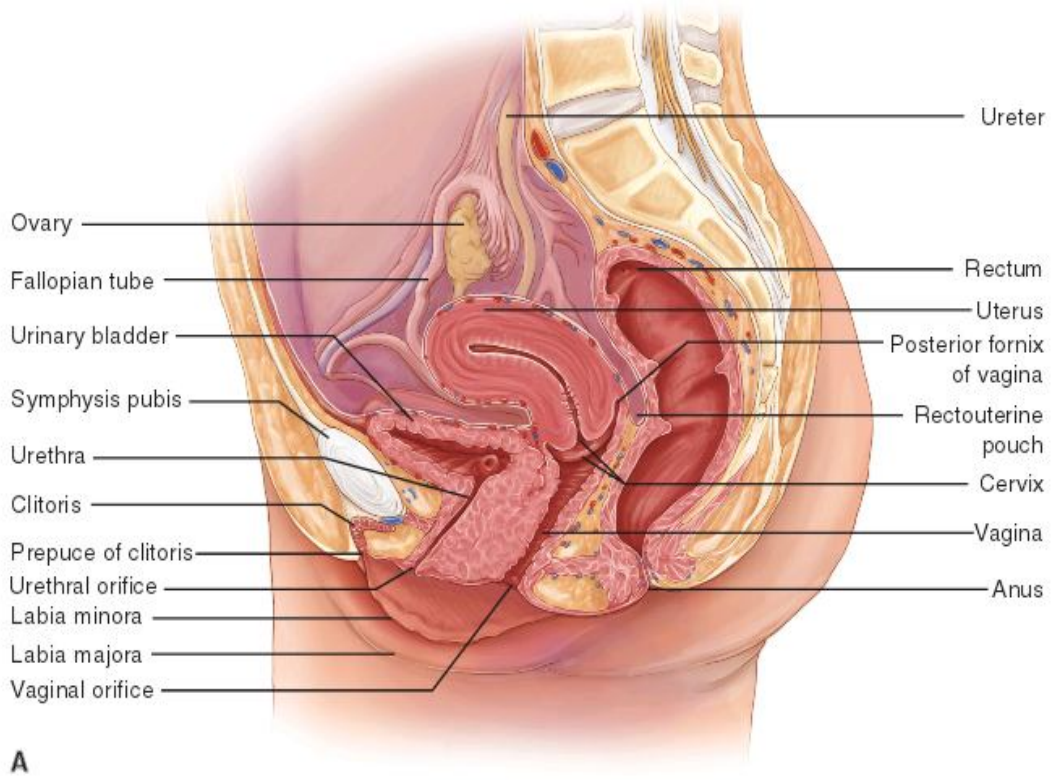
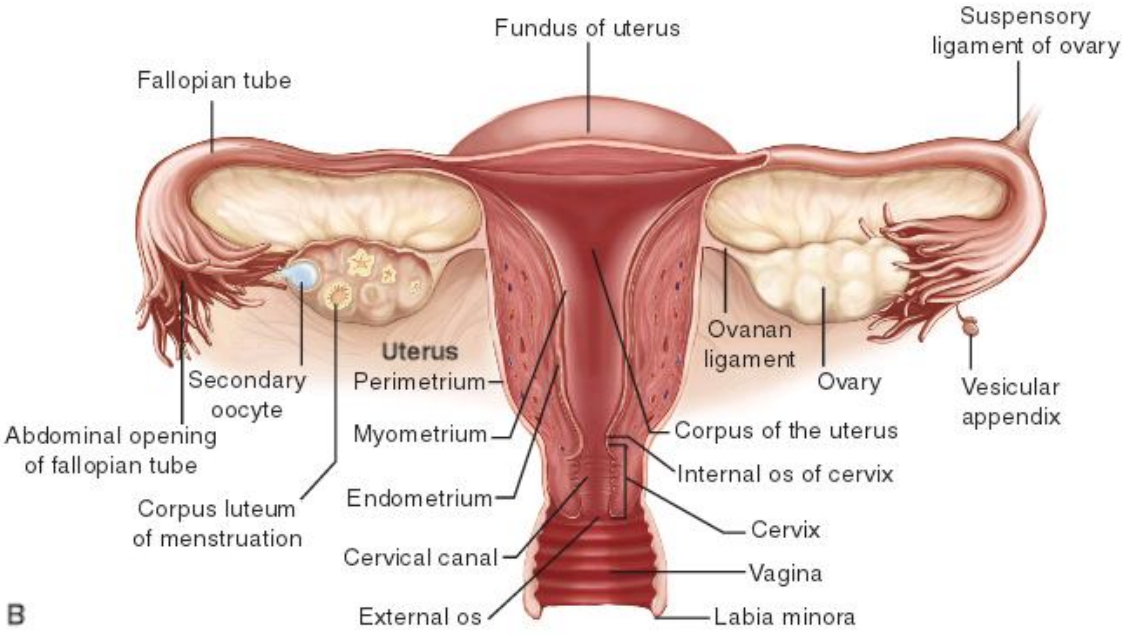


Figure 2.1 Shows lateral view of internal female reproductive organs (Atlas of human anatomy 2001)



Figer2-2 shows anterior view of internal female reproductive organs (Atlas of human anatomy2001)

2-2 Anatomy of fallopian tubes:

The female adnexal structures are located in the lesser pelvis and include the fallopian tubes, the ovaries, and ligament us attachments. The fallopian tubes are 8- to 15-cm long paired tubular structures at the superior aspect of the broad ligament. They extend from the uterus to the ovaries and are composed of the intramural portion, the isthmus, the ampullary part, and the infundibulum with the abdominal ostium. The latter is trumpet shaped, opens at the ovarian end into the peritoneal cavity and is composed of irregular finger like extensions, the fimbriae, which overhang the ovary . The in- fundibulum narrows gradually from about 15 mm to about 4 mm in diameter and merges medially with the serpiginous ampullary portion of the tube, which comprises more than half of the length of the fal lopian tube. A thickening of the muscular wall, the isthmic portion extends for 2 cm

towards the uterus. Within the uterus the 1- to 2-cm long intramural segment joins the extension of the endometrial cavity, the uterotubal junction. At its extrauterine course the fallopian tube lies within the two folds of the broad ligament [Susan Standring 2008].

2-3 Anatomy of overies

The ovaries are typically located in the ovarian fossa close to the lateral pelvic side walls. In most women the ovaries can be identified laterally and superiorly of the uterine cornua near the bifurcation of the common iliac artery between internal and external iliac arteries. Occasionally, the ovaries may be found at atypical sites , e.g., adjacent to the uterine corpus, superior and posterior to the uterine fundus, or in the posterior cul-de-sac. Due to its anchoring to the posterior border of the broad ligament the ovary is typically located in the posterior pelvic compartment and above the uterine fundus, but not in the anterior cul-de-sac . When the uterus, however, is retroverted one or both ovaries may be found anterior or posterior to the uterus. Furthermore, pregnancy, diseases associated with uterine enlargement such as fibroids, or pelvic masses can displace the ovaries outside the lesser pelvis.

Adult ovaries measure approximately 3–5 cm in length, 1.5–3 cm in width, and 0.5–1.5 cm in thickness. Their size, however, varies considerably, depending on age, hormonal status, menstrual cycle, and the contents of follicular derivatives. The ovaries are of ovoid, almond shape with a smooth surface in early reproductive age , that becomes more irregular thereafter. The ovary is encapsulated by a thin fibrous layer, the tunica albuginea. Within the capsule lies the ovarian stroma, which consists of fibroblasts, smooth muscle cells, arteries, veins, lymphatics, nerves, and follicles.

Histologically, the ovaries contain three ill defined zones: the outer cortex, the highly vascular inner medulla, and the hilum[Susan Standring 2008].

2-3-1Ovarian Attachments and Vascular Supply:

The broad ligament is formed by two layers of peritoneum which drape over the uterus and extend later- ally to the pelvic side walls. Its caudal margin is defined by the cardinal ligament. The superior free margin is formed by the fallopian tube medially and the suspensory ligament of the ovary laterally. Between these peritoneal folds lies the parametrium which contains the fallopian tube, round ligament, ovarian ligament, uterine and ovarian blood vessels, nerves, lymphatics, mesonephric remnants, and the parts of the ureter.

Each ovary is suspended in the peritoneal cavity by three supporting structures: the mesovarium which anchors the ovary to the posterior aspect of the broad ligament; the ovarian ligament which attaches the ovary to the uterine cornu; and the suspensory ligament or infundibulopelvic which anchors the ovary to the pelvic side wall. The ovarian ligament and suspensory ligament are not tight supporting structures but more comparable to a mesentery . The ovarian blood vessels and lymphatics course within the peritoneal folds of the mesovarium and enter and exit the ovary through the ovarian hilum. Anastomosing branches of the ovarian and uterine vessels in close relationship with lymphatics are located within the mesovarium . The suspensory ligament of the ovary is located at the superior lateral aspect of the broad ligament . It extends from the ovary anterolaterally over the external and common iliac vessels and blends with connective tissue over the psoas muscle . Ovarian blood vessels and lymphatics traverse the suspensory ligament to reach the ovarian hilum along the mesovarium. The

ovarian ligament is a rounded fibromuscular band extending from the ovary to the uterine cornu . Its position varies with that of the ovary. It is located immediately posterior and inferior to the fallopian tube and round ligament . The ovarian branches of the uterine artery pass through the ovarian ligament and anastomose with branches of ovarian artery in the mesovarium. The ovarian artery originates from the lumbar aorta near the renal hilum. It is accompanied along its retroperitoneal course by the ovarian vein and the ureter on the anterior surface of the psoas muscle. It then crosses the ureter and common iliac vessels near the pelvic brim to enter the suspensory ligament of the ovary. The ovarian artery courses inferiorly and medially between the two layers of the broad ligament near the mesovarian border . It forms multiple branches that reach the ovarian hilum via the mesovarium. It has a tortuous course that is most pronounced near the ovary. The ovarian vein is typically single, but may also be multiple and accompanies the ovarian artery. The venous drainage is into the left ovarian vein, and the inferior vena cava on the right side. The ovarian lymphatics ascend with the ovarian vessels along the psoas muscle and drain almost ex- clusively into the para-aortal lymph nodes at the level of the lower pole of the kidneys. In some patients, ac- cessory channels pass the broad ligament and drain into the internal and common iliac and interaorticlymph nodes, or course along the round ligament to the external iliac and inguinal lymph nodes . In the fallopian tube, additional lymphatic channels to presacral nodes, and occasionally from the ampulla, to gluteal nodes may exist [KyungW 2012].

2-4 Physiology

2-4-1 Physiology of the ovary:

As endocrine glands, the ovaries are responsible for releasing estrogen and progesterone in varying amounts throughout the menstrual cycle. They may be located anywhere within the true pelvis, excluding the anterior cul-de-sac. The ovarian fossa is located posterior to the ureter and internal iliac artery and superior to the external iliac artery. The ovary consists of an outer cortex and an inner medulla. The medulla contains the ovarian vasculature and lymphatics, while the cortex involves the mass of the ovary and is the site of oogenesis. The ovaries are stimulated by follicle-stimulating hormone, released by the anterior pituitary gland, to develop multiple follicles during the first half of the menstrual cycle (follicular phase). The cells surrounding the tiny follicles produce estrogen, which stimulates the endometrium to thicken. Only one of these follicles will become the dominant follicle, or graafian follicle, prior to ovulation, while all other follicles will atrophy. The ovumis contained within the cumulus oophorus of the dominant follicle. The cumulus oophorus may be seen within the ovary during a sonographic examination, with the sonographic appearance resembling that of a daughter cyst. At approximately day 14 of the menstrual cycle, ovulation occurs, as the dominant follicle ruptures, releasing the mature ovum and a small amount of follicular fluid into the peritoneal cavity. Mittelschmerz, which means middle pain, describes pain at the time of ovulation, typically on the side of the dominant follicle. The fluid from the ruptured follicle most often will settle in the rectouterine pouch (pouch of Douglas), the most dependent portion of the peritoneal cavity. After the graafian follicle has ruptured, its structure is converted into the corpus luteum. During the second half of the

menstrual cycle (luteal phase), the corpus luteum produces progesterone and, in small amounts, estrogen. If fertilization occurs, the corpus luteum is maintained and becomes the corpus luteum of pregnancy. If fertilization does not occur, the corpus luteum regresses and becomes the corpus albicans.[Fariden.J2007-2008]

2-4-2 Physiology of fallopian tube:

The fallopian tubes may be referred to as oviducts, uterine tubes, or salpinges. The primary purpose of the fallopian tube is to provide an area for fertilization and to offer a means of transportation for the products of conception to reach the uterine cavity. The fallopian tubes consist of three layers: the outer serosa, middle muscular layer, and inner mucosal layer. As the tube experiences peristalsis, within its lumen, small, hairlike structures referred to as cilia shift, thereby offering a mechanism for the transportation of the fertilized ovum. The 7- to 12-cm paired fallopian tubes extend from the cornu of the uterus, travel within the broad ligaments, and are composed of five parts . It is important to note that the proximal segment of the fallopian tube is located closest to the uterus, while the most distal part is within the adnexa or closer toward the ovary. Within the cornu of the uterus lies the intramural extension of the fallopian tube known as the interstitial segment. The isthmus, which literally means bridge, is a short and narrow segment of the tube connecting the in- terstitial area to the ampulla. The ampulla is the longest and most tortuous segment of the tube. It is a significant portion of the tube because it is the location of fertiliza- tion and the area where ectopic pregnancies often embed. The distal portion of the tube is termed the infundibu- lum, which provides an opening to the peritoneal cavity within the pelvis. The fingerlike projections that extend

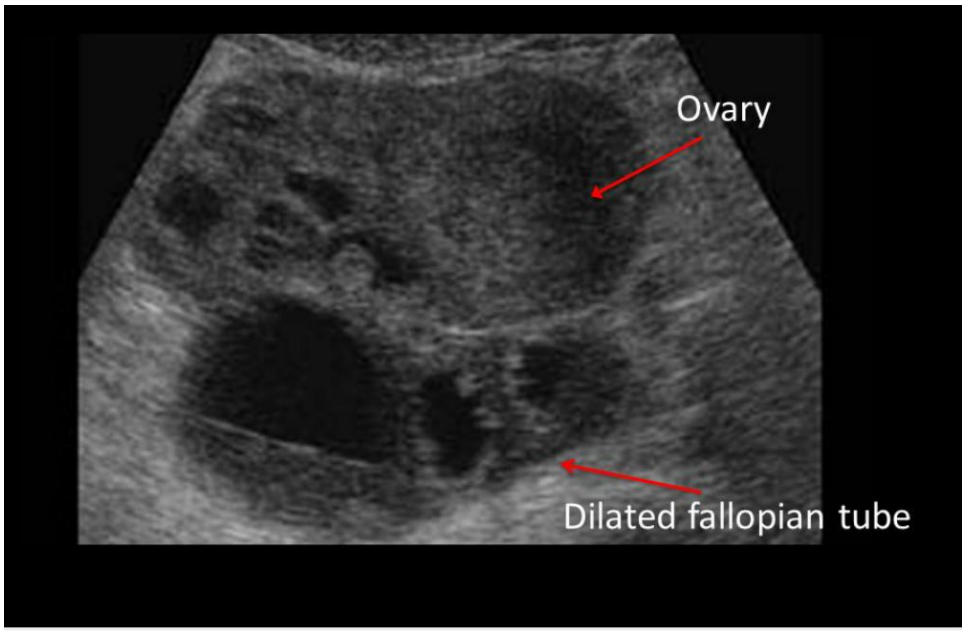
from the infundibulum are the fimbria. The primary role of the fimbria is to draw the unfertilized egg into the tube[ArthurC.Guyton2006]

2-5 Pathology:

2-5-1 Pelvic Inflammatory Disease:

Pelvic inflammatory disease (PID) is an infection of the upper genital tract. The origin of the majority of upper genital tract infections is ascension of an infection from the lower genital tract. Infections can travel into normally sterile areas such as the endometrium and fal- lopian tubes, Previous history of PID, the utilization of an in- trauterine contraceptive device, postabortion, post childbirth, douching, multiple sexual partners, and early sexual contact have all been established as risk factors for developing PID, PID may manifest after pelvis surgery, accompany tuberculosis, or occur in association with an abscessed appendix or ruptured colonic diverticulum. However, the most common cause of PID is sexually transmitted diseases like chlamydia and gonorrhea. The sonographic findings of acute and chronic PID vary. The uterus involved with an acute infection may show signs of a thickened, irregular endometrium, which is often indicative of endometritis.The uterus can have ill-defined borders and the fallopian tubes may contain fluid. Echogenic material within the tubes can be evidence of pyosalpinx, while simple-appearing fluid may be referred to as hydrosalpinx. The sonographer should look for further signs of a tubo-ovarian abscess. Chronic PID can lead to continual pelvic or abdominal pain, infertility (resulting from adhesions and scaring of the fallopian tubes), possible palpable adnexal mass, and irregular menses, Sonographically, long-standing PID can reveal evidence of markedly distended fallopian tubes, the

development of adhesion between the pelvic organs, and further findings consistent with tubo-ovarian complex and/or tubo-ovarian abscess.[HarshM.2010]



Finger 2-3 U/S image shows PID[AndreaG.Rockall2013]

2-5-2 Tubo-ovarian Complex and Tubo-ovarian Abscess:

As PID progresses and reaches beyond the fallopian tubes, the ovaries and peritoneum become involved. Consequently, adhesions develop within the pelvis that lead to the fusion of the ovaries and the dilated tubes, a condition known as tubo-ovarian complex, further progression of PID beyond this stage leads to a tubo-ovarian abscess. The sonographic findings of these two processes are similar in that upon sono- graphic examination the pelvic structures are often in- distinguishable, with a loss of discrete borders of the adnexal structures occurring more often when an abscess has developed. Treatments for these two conditions differ in that drainage is required only when an abscess has developed, consequently, it is important to understand

the sonographic appearance of both abnormalities. Sonographically, the tubo-ovarian complex has signs of PID progression that include a thickened, irregular endometrium, pyosalpinx or hydrosalpinx, cul-de-sac fluid, and often bilateral complex adnexal masses. The distinguishing feature is that the ovaries and tubes are more readily recognized as distinct structures, but the ovaries will not be able to be separated from the tube by pushing with the vaginal probe. Conversely, when an tubo-ovarian abscess is present within the pelvis, there will be a complete loss of borders of all adnexal structures, and the development of a conglomerated adnexal (possibly bilateral) mass.

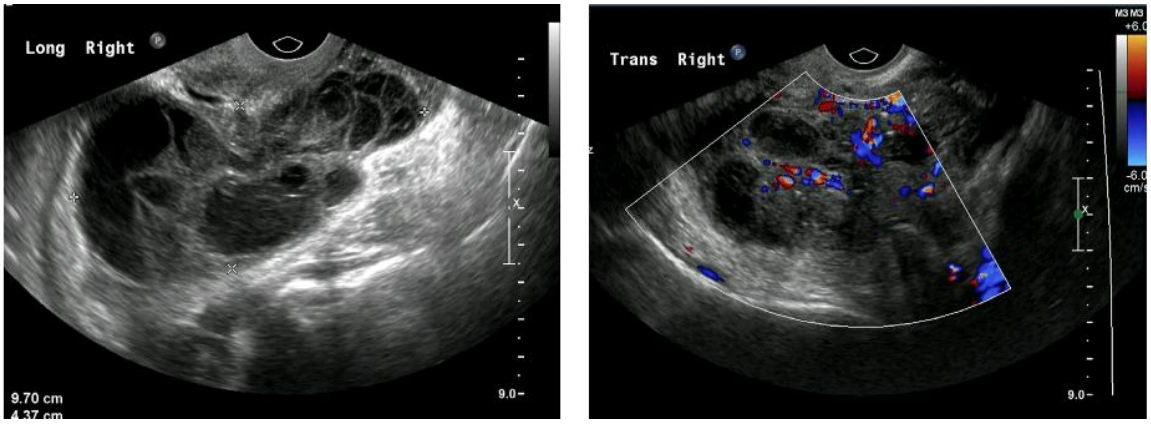


Figure 2-4 U/S image shows complex solid and cystic mass with internal vascularity in tubo overian abscess[ArmstrongM.Wastie2013]

2-5-3 Ectopic pregnancy:

An ectopic pregnancy is the most common cause of pelvic pain with a positive pregnancy test.9 It can lead to pregnancy loss and, in some cases, maternal death. An ectopic pregnancy is defined as a pregnancy located any-where other than the endometrial or uterine cavity. Women with a history of assisted reproductive therapy (technology), fallopian tube scarring, and/or

pelvic inflammatory disease are among the list of patients who are at high risk for ectopic pregnancies, the most common location of an ectopic pregnancy is within the fallopian tube, specifically the ampullary portion of the tube. Other locations for ectopic implantation include the isthmus of the tube, the fimbria, abdomen, cornu of the uterus (interstitial of tube), ovary, and cervix, with the least common locations being the latter two, although rare, patients can have an ectopic pregnancy and intrauterine pregnancy co-existing. This is termed a heterotypic pregnancy. Patients who are undergoing assisted reproductive therapy are at increase risks for heterotopic pregnancies. Sonographically, an ectopic pregnancy may be obvious, offering evidence of an extrauterine gestational sac that contains a fetus and yolk sac. Other sonographic findings include the adnexal ring sign, an adnexal mass, a large amount of free fluid within the pelvis and in Morison pouch (with complex free fluid representing hemoperitoneum),a pseudogestational sac, and a poorly decidualized endometrium.[StevenM.Penny2011]

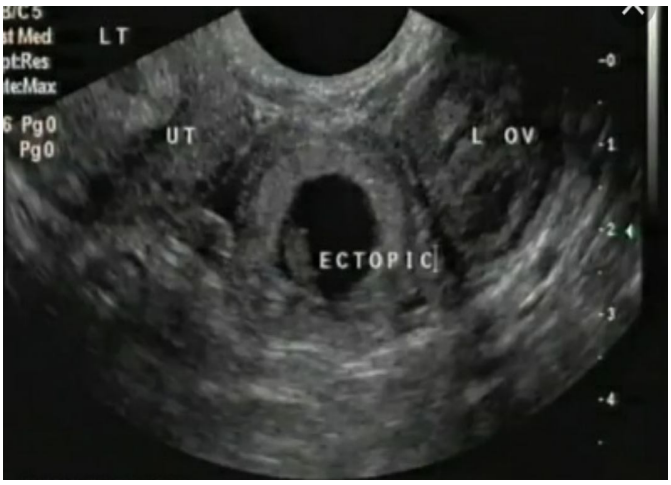


Figure 2-5 U/ S image shows extra uterine gestational sac with fetal part inside the sac.[StevenM.Penny2011]

2-5-4 Endometriosis:

Endometriosis is defined as functional, ectopic endometrial tissue located outside of the uterus. Implantation of ectopic endometrial tissue may be the result of endometrial tissue being passed through the fallopian tubes during menstruation or may result from scarring from surgery, such as after a cesarean section. This ectopic tissue does undergo physiologic changes as a result of stimulation by the hormones of the menstrual cycle. Hemorrhage of this tissue often occurs, resulting in focal areas of bloody tumors known as endometriomas or chocolate cysts. Endometriosis can be located anywhere throughout the pelvis, with the most common location being the ovaries. Patient may also have dysmenorrhea, menorrhagia, painful bowel movements, or may be completely asymptomatic. Sonography can be used to indicate the existence of endometriomas; however, smaller implants may be overlooked. Endometriomas are commonly cystic masses with low level echoes that may or may not contain fluid–fluid levels[StevenM.Penny2 011]

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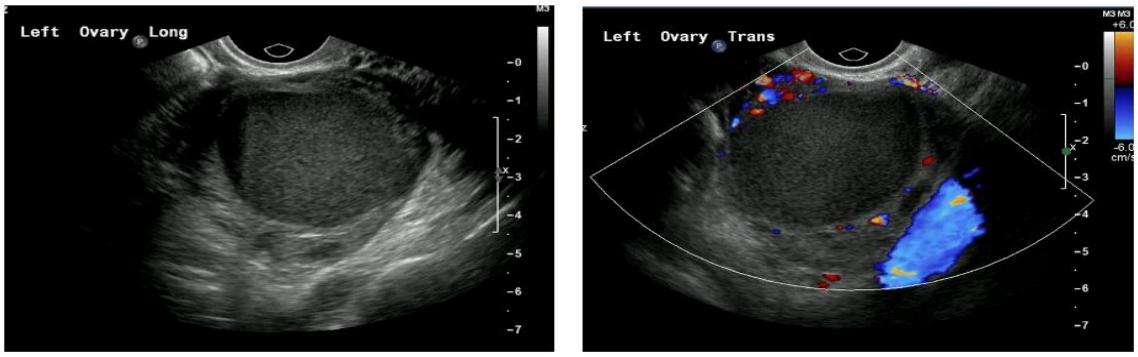

Figure 2-6 U/S images show peripheral vascularity around acystic mass with homogeneous low level internal echo (endomettioma) [StevenM.Penny2011].

2-5-5 Ovarian torsion and ovarian cysts:

Benign adnexal masses are common during the reproductive years, and physiologic cysts are frequent findings. Ovarian cysts and ovarian torsion are 2 considerations in the differential diagnosis of acute pelvic pain. Functional or physiologic cysts include follicular cysts, corpus luteum cysts, and theca lutein cysts. Large follicular cysts may cause pelvic pain and dyspareunia. Most follicular cysts resolve spontaneously. Adnexal torsion refers to twisting of the ovary and/ or the fallopian tube, which can lead to ovarian edema, ischemia, infarction, and necrosis. The pain associated with torsion is acute in onset and unilateral in location. Ovarian torsion can occur spontaneously or can be caused by a cyst or underlying ovarian neoplasm that predisposes the ovary to rotate on its vascular pedicle. Unlike menstruation-related disorders, torsion can occur in premenopausal and postmenopausal women, although it is far less common after menopause. Ovarian torsion most often occurs on the right side and poses a diagnostic dilemma due to the difficulty in differentiating it from acute appendicitis[TrishChudleigh2004].

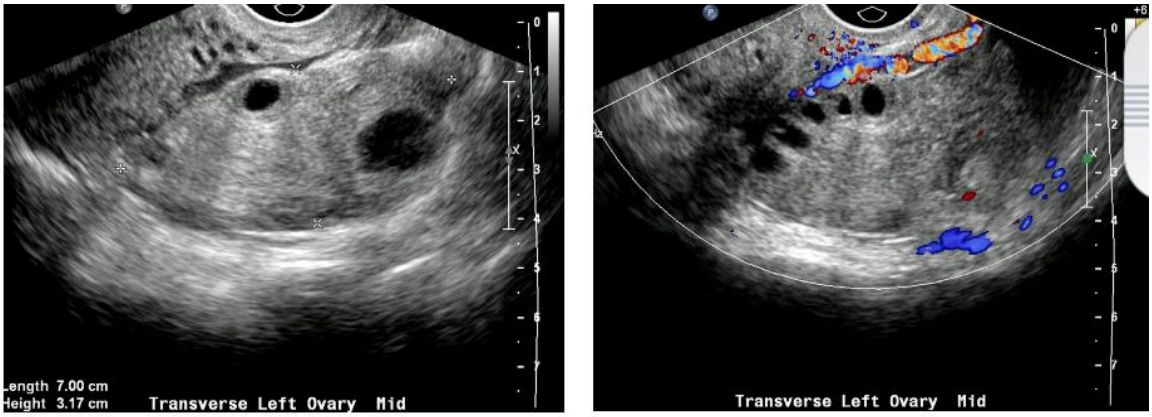

Figure 2-7 U/S images show an enlarge ovary with prominent peripheral located follicles with lack of parenchymal blood flow. [TrishChudleigh2004].

2-5-6 Chronic Pelvic Pain:

The peak prevalence of chronic pelvic pain occurs at approximately age 30 years.Theetiologyofchronicpainare

Endometriosis, gynecologic malignancies, Residual ovary syndrome, Pelvic congestion syndrome, Pelvic inflammatory disease, and adnexal cysts [EdwardF.Golijan2010].

2-5-6-1 Gynecological malignancy:

Solid Tumors Mixed solid to cystic ovarian masses are typical of all the epithelial ovarian tumors; the most common are the serous types: cystadenoma and cystadenocarcinoma . During the peak fertile years, only 1 in 15 is malignant; this ratio becomes 1 in 3 after age 40. The more sonographically complex the tumor, the more likely it is to be malignant, especially if associated with ascites. The epithelium of serous tumors is tubal in type, and there may be one or multiple cysts. One fourth of them is bilateral, and most occur in women over age 40. They are large and often fill

the pelvic cavity. The differential considerations of a solid-appearing adnexal mass include pedunculated fibroid, dermoid, fibroma, thecoma, granulosa cell tumor, Brenner tumor, and metastasis. Tubo-ovarian abscess, ovarian torsion, hemorrhagic cysts, and ectopic pregnancy also may appear solid. Solid adnexal masses are often difficult to diagnose because normal ovarian size varies widely. The use of color Doppler can be helpful, as color can be used to identify a vascular pedicle between the uterus and the mass, as can often be identified with pedunculation.[AsimK.Frank2006]

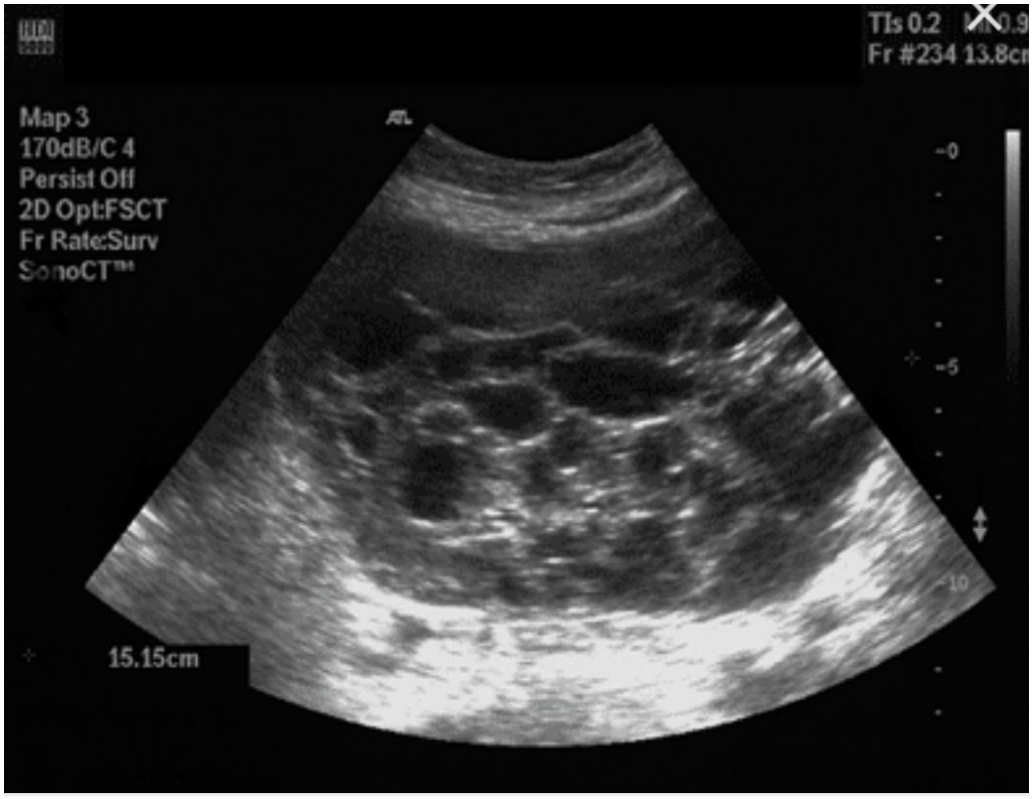

Figure 2-8 U/S image shows multicystic and solid complex mass [AsimK.Frank2006].

2-5-6-2 CysticTeratoma:

Often asymptomatic , If torsion or rupture occurs, the patient may present with acute pelvic, sonographically Complex, partially cystic mass in the ovary that includes one or more echogenic structures that may shadow , “Tip of the iceberg” sign only the anterior element of the mass is seen, while the greater part of the mass is obscured by shadowing , Dermoid plug produces posterior shadowing and Dermoid mesh produced by hair and will appear as numerous linear interfaces within the cystic area of this mass.[StevenM.Penny 2011].

2-5-6-3 Pelvic congestion syndrome:

Also known as pelvic vein incompetent is a chronic medical condition caused by varicose veins in the lower abdomen ,pregnancy can cause but most of the cases of unknown reason. ultrasound usually not very helpful in diagnosis the condition.[https://en.m.wikipedia.org]

2-5-6-4 Residual ovary syndrome:

Is condition that occurs when ovarian tissue is left behind following oophorectomy causing development of a pelvic mass, pelvic pain and occasionally dyspareunia, in ultrasound find cystic ,solid or complex mass may contain blood vessels. .[https://en.m.wikipedia.org]

2-6 Investigations done for female pelvic:

2-6-1 General investigation:

- Urine general and urine culture: may able to detect organism sesponsible for PID like N.gonorrhoea ,C.trachomatis ,or M.genitalium.

- Blood test:elevated c.reactive protine or ESR or high white cell count, pregnancy test is important for fear of ectopic pregnancy, high level of

serum B-human chorionic gonadotropin (normal level between 1000and 2000mlu/ml).

2-6-2 Radiological tests:

2-6-2-1 Chest x-ray and HSG:

Which is a less-preferred procedure used to visualize the uterine cavity and confirm tubal patency. It involves ionizing radiation and carries the risk of infection and injury .also Chest x-ray for patient with malignancy.

2-6-2-2 Computed Tomography (CT):

CT has a limited role in the assessment of patient with pelvic pain due radiation exposure in a predominantly younger age group It can be helpful to differentiate between conditions that may mimic PID like appendicitis where its efficacy is proven, however it is generally rarely used due to the aforementioned radiation exposure CT has been used to diagnose TOA where US has been inconclusive with sensitivities ranging from 78 percent – 100 percent in the literature 30,31 Information for consumers about CT Inside Radiology.

2-6-2-3 Magnetic Resonance Imaging (MRI):

It is best for delineating the morphology and orientation of pelvic structures. Though it is noninvasive and radiation-free, it has limited availability and high cost, and hence cannot be repeated easily. Longer examination time, failure to delineate sub-centimeter uterine lesions, and inability to characterize endometriomas at some stages are other limitations. MRI is contraindicated in patients with cardiac pacemakers and cochlear implants. MRI also detects pathological lesions, including tubal lesions and pituitary

adenoma. It helps in predicting the prognosis in conservatively treated cases of leiomyoma, adenomyosis, and endometriosis.

2-6-2-4 Nuclear Medicine Imaging:

Nuclear medical imaging is another modality that is rarely used, but available for the assessment of pelvic pain. Similar to MRI the use of nuclear imaging is limited by logistical and clinical considerations Scintigraphy using leucocytes labelled with 99mTc hexamethylpropylenamine oxime (99mTc- HMPAO) was used to assess the ability to detect patients with acute PID. 33 In this study a sensitivity of 100 percent and specificity of 90 percent was achieved in the detection of PID In a similar study using 99mTc-HMAPO to assist in diagnosing TOA caused by PID, a sensitivity of 100 percent and specificity of 91.6 percent was achieved 34 Limitations with integrating these imaging modalities into clinical practice include the requirement for repeat scan protocols, local expertise, radiation exposure and availability of resources Information for consumers about Nuclear Medicine InsideRadiology

2-6-2-5 Ultrasound:

Patient pereperation and history is critical in order to tailor the ultra- sound exam and correlate ultrasound findings with the proper differential consideration. It is useful for the sonographer to use a routine patient questionnai rerequesting the following information: date of last men- strual period, gravidity, parity, physiologic menstrual status, hormone regimen, symptoms, history of cancer, family history of cancer, past pelvic surgeries, laboratory tests, previous Pap or biopsy results, and pelvic examination findings. A review of previous examinations (ultra- sound, CT, MRI, PET)

should be done before the start of the ultrasound exam to determine if a mass was previously present and to assess if there has been any change in size or internal characteristics.[Harald Lutz 2011]

2-7 SonographicTechnique:

The female pelvis is routinely evaluated with at least one of two ultrasound techniques: trans abdominal (TA) and trans vaginal (TV), the TA examination is performed from the anterior abdominal wall using a curvilinear, or sector, transducer with frequencies of up to 5 MHz. TA scans typically use the distended urinary bladder as a “sonic” window to identify the uterus and adnexa as an overview of the other pelvic structures. If the protocol is to do a TA study in conjunction with a TV study, not all institutions begin with the urinary bladder fully distended. Even when the urinary bladder is only partially distended or is empty, a TA scan may still help as an overview to the pelvic structures. The TV examination is performed with the patient’s bladder empty, using higher transducer frequencies of 7.5 MHz or more. These higher frequencies have better near-field focusing and resolution, which permit greater detail and characterization of the uterus and adnexa. Transabdominal and transvaginal sonography are complementary techniques, and both are used extensively in evaluation of the female pelvis. Anatomy and pathology should be identified in at least two orthogonal planes, usually sagittal and axial or coronal and transverse, using both techniques[.PeterH.KevinM2010]

2-7-1 Transabdominal (TA) Ultrasonography:

The trans abdominal approach visualizes the entire pelvis and gives a global overview, the trans abdominal technique may be limited in patients

who are obese and unable to fill their urinary bladders, older patients who are unable to fill due to incontinence issues, or in patients with a retroverted uterus, this technique gives a less optimal characterization of adnexal masses because of its distance from the transducer and interference from the bowel, for an initial study of the female pelvis, it is recommended that a TA study be made, especially if the patient has not had a previous ultrasound. Instruction should be given to the patient to drink at least 32 oz of fluid 1 hour before examination time and not to empty her bladder before the scheduled appointment, the full bladder displaces the bowel and any gas it contains from the field of view and “flattens” the anteflexed uterus slightly so it is more perpendicular to the transducer angle. If the ovaries lie anteriorly, the use of a higher-frequency transducer may be preferable. If the patient is obese, the lower-frequency transducer may be used. The TA examination is best initiated by identifying the urinary bladder and evaluating its walls and lumen. It is important to definitely identify the urinary bladder to rule out the possibility of a midline cystic, complex mass, or free fluid, which can inadvertently be mistaken for the bladder. The patient may even feel that she has a full bladder if a large mass is pushing against the urinary bladder. The bladder shape may be helpful because a well-distended bladder typically has a triangular or elongated shape on midline scans. If there is any question as to whether a cystic structure in the pelvis represents the bladder, it can be confirmed by having the patient void or by checking for ureteral jets entering the bladder. The uterus should then be identified in its long axis. This may not be in a true anatomic sagittal plane because the uterus can normally deviate toward either the right or the left. A somewhat oblique angulation through the distended bladder may be necessary to visualize the entire uterus and cervix. Anatomic orientation is

correct for longitudinal scans when the left side of the screen represents cephalic anatomy (toward the patient's head) and the right side of the screen represents caudal anatomy (toward the patient's feet). Once the long axis has been established, parallel sagittal scans are then obtained to the right and left to evaluate the uterine margins and the adnexa. The adnexal area may be imaged by scanning obliquely from the contralateral side and scanning through the fluid-filled bladder. In many instances, the adnexal area can be visualized by scanning directly over the adnexal area. Gentle pressure with the transducer on the pelvic area may be necessary to bring the area of interest within the focal zone. The iliac vessels can be used as a landmark to identify the lateral adnexal borders, and then rotating the transducer 90 degrees, the axial or axial-coronal (transverse) images can be obtained. A routine protocol consists of longitudinal and transverse scans of the uterus (to include the myometrium and endometrium), cervix, rectouterine recess (cul-de-sac), right adnexa, and left adnexa , measurements of normal structures and pathology are made in the length, width, and depth dimensions. Additional information may be obtained by the Doppler evaluation of all pelvic anatomy and pathology,if pathology is present, documentation of the right upper quadrant (Morison's pouch and subphrenic area) and bilateral renal areas must be obtained[SandraL.Tlagen.Ansert].

2-7-2 Transvaginal Ultrasonography:

The inclusion of the trans vaginal (TV) transducer in standard gynecologic sonography protocols has vastly improved the effectiveness of the pelvic exam, this exam allows the sonographer and physician a better visual survey by shortening the distance from the transducer to the ovaries, uterus, and adnexal regions. The resolution of pelvic structures has improved and the

ability to zoom in on smaller objects has been enhanced, this advance in technology brings with it more frequent detection of small tissue differences. After the trans abdominal study is completed, the patient is asked to empty her bladder completely.An adequate explanation of the procedure is essential. Many patients are apprehensive at any mention of an “internal” examination, and the referring physician may not have explained the possibility of having one. It is important to explain why it is necessary to perform the transvaginal exam and to stress that the examination is a simple, usually painless procedure and that only part of the probe is inserted. . Examination Technique. After the patient has completely voided, she is asked to undress from the waist down, given a gown, and covered with a sheet. The patient position should be supine, knees gently flexed, and hips elevated slightly on a pillow or folded sheets and feet flat on the table, approximately shoulder length apart. The head and shoulders are slightly elevated with a pillow. A slightly reversed Trendelenburg’s position may be helpful in lowering the pelvic organs to enhance visualization and detect free intraperitoneal fluid that gravitates to the posterior cul-de-sac. TV is the first-line investigation and can be coupled with color Doppler and 3D/4D scans. It is readily available, inexpensive, noninvasive, radiation-free, relatively less time consuming and easily repeatable. Limitations include subjective errors, limited field of view, and interference by obesity or by gaseous bowel loops, suboptimal visualization of fallopian tubes and broad ligament, failure to delineate small ovaries, and inability to obtain images in the surgical plane. USG helps in determining the morphology of the uterus and ovaries, uterine and ovarian perfusion, and endometrial thickness, volume, and vascularity. It detects pathological lesions, including tubal lesions and abnormalities of follicular maturation and ovulation. Tubal

patency can be confirmed through sonosalpingography. USG can guide oocyte retrieval and embryo transfer in in vitro fertilization procedures and drainage of pelvic collections or cystic lesions.[SandraL.Tlagen.Ansert].

2-7-3 Sonographic appearance of the Ovary:

Sonographically, the normal ovary is homogenous with a medium-level to low-level echogenicity. Multiple follicles may be noted with sonography during the neonatal and prepubertal ages. Also, follicles on the ovaries, of varying sizes, may be seen throughout the normal menstrual cycle during reproductive years. Typical ovarian flow is said to be high-resistant during the menstrual and proliferative phases and low- resistant at midcycle,the size of the ovary depends on the age of the patient. Ovarian volume can be determined sonographically by utilizing the following formula: volume length width height 0.5233.2 It is important to note that the postmenopausal ovaries atrophy and are often difficult to locate sonographically[StevenM.Penny2011]

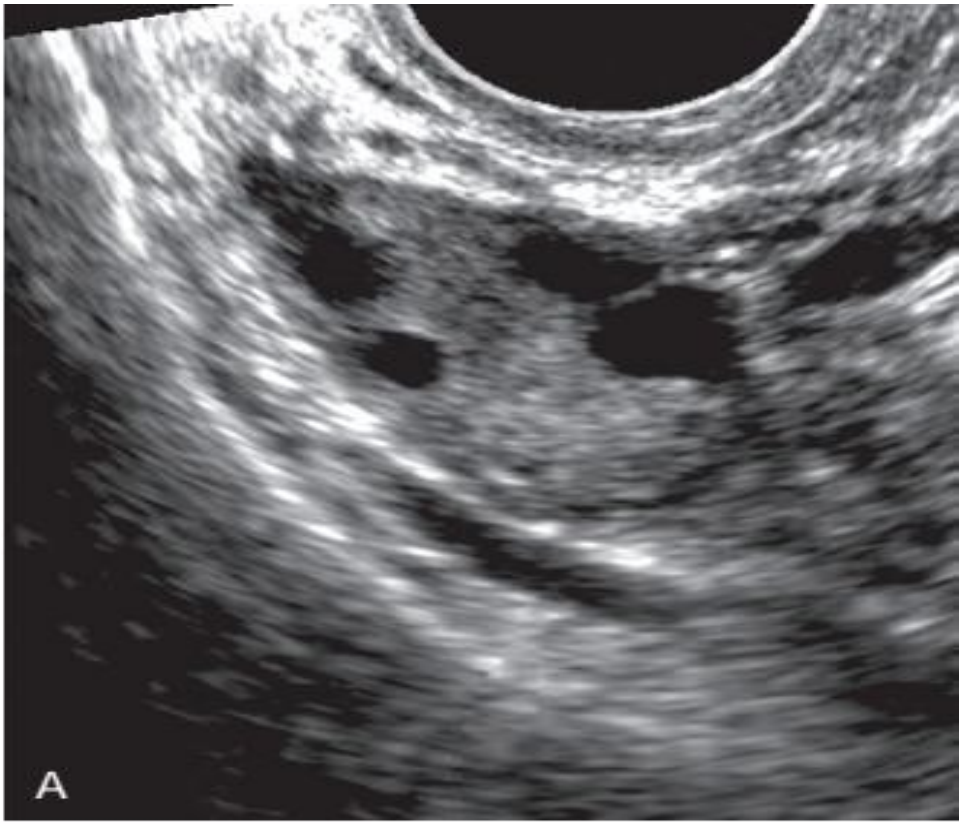

Figure 2-9 show normal sonographic appearance of the overy.[StvenM.Penny2011]

2-7-4 Sonographic appearance of fallopian tubes:

The fallopian tubes are not customarily identified on a trans abdominal ultrasound examination; however, some segments can be seen with today's high-resolution endovaginal transducers. Certainly in cases in which the tube has been involved with an inflammatory process or is obstructed, the tubes, when distended with fluid, can be visualized with sonography. The inner cavity of the fallopian tubes can be visualized and evaluated for patency using sonohysterography or hysterosalpingography[CarolM.Rumack2011].

Sonographic appearance of adnexal causes of pelvic pain are mention with the diseases.

2-8 Previous studies:

Study done by **Faye C. Laing etal 2012** evaluate an adnexal mass is a common task faced by sonologists. Assimilating and applying the information presented in this article will hopefully permit accurate classification of adnexal masses into one of three categories: benign, indeterminate, or malignant. Recognition of the six most common benign ovarian lesions and the three most common benign extraovarian adnexal lesions should help avoid additional or unnecessary imaging. Conversely, identifying features that strongly suggest malignancy will result in timely management rather than a delay caused by additional follow-up imaging. Finally, proper reporting and management recommendations serve to alleviate anxiety and misinterpretation on the part of the patient and physician.

Carolyn etal 2015 study acute onset of pelvic pain found that ax Faye C. LaingSearch for articles by this author cute-onset pelvic pain is an extremely common symptom in premenopausal women presenting to the emergency department. After excluding pregnancy in reproductive-age women, ultrasonography plays a major role in the prompt and accurate diagnosis of adnexal causes of acute pelvic pain, such as hemorrhagic ovarian cysts, endometriosis, ovarian torsion, and tubo-ovarian abscess. Its availability, relatively low cost, and lack of ionizing radiation make ultrasonography an ideal imaging modality in women of reproductive age. The primary goal of imaging in these patients is to distinguish between adnexal causes of acute pelvic pain that may be managed conservatively or medically, and those requiring emergency/urgent surgical or percutaneous intervention this study was comatable with my research.

PaulS.KruszkaMD2010 study diagnosis of pelvic pain in women and found that diagnosis of pelvic pain can be challenging because many symptoms and signs are insensitive and non specific,as the first priority urgent life threatening condition like ectopic pregnancy, appendicitis, ruptured ovarian cyst, PID, and ovarian torsion must be considered .The most common urgent causes of pelvic pain are PID and ruptured ovarian cyst.20-50 %of women with pelvic pain causes are PID,2%ectopic pregnancy, 1%endometriosis,12%ovarian cyst , this study was combatable with my research.

Dr sarah Martin 2014 study PID and found that pelvic inflammatory disease (PID) – inflammation of the upper genital tract may include cervicitis, endometritis, salpingitis, tubo-ovarian abscess and pelvic peritonitis. PID usually occurs from ascending micro-organisms from the vagina and cervix, although a causative organism is not always isolated. PID may result from a sexually transmitted infection, infection post-gynaecological procedure, postnatally or, rarely, from haematological spread. Early diagnosis and treatment reduces the risk of long-term sequelae, including chronic pelvic pain and tubal factor infertility.

Royal collage of obstetricians and gynecologist2010 found pelvic inflammatory disease (PID) is an inflammation in the pelvis. It is usually caused by an infection spreading from the vagina and cervix (entrance of the uterus) to the uterus (womb), fallopian tubes, ovaries and pelvic area. If severe, the infection may result in an abscess (collection of pus) forming inside the pelvis. This is most commonly a tubo-ovarian abscess (an abscess affecting the tubes and ovaries). PID is common and accounts for one in 60 GP visits by women under the age of 45 years .

Chapter Three

Materials &Methods

3-1 Study design:

This was a descriptive cross sectional study which designed to detect causes pelvic pain causes in a non pregnant women using ultrasonography.

3-2 Area of study:

Study was conducted in Omderman Maternity hospital for obstetric and gynecology, in Omdurman city, republic of Sudan.

3-3 Study duration:

Study was carried out from August to December 2016.

3-4 Sample of the study:

The sample of the study is 50 women with pelvic pain whom presented to ultrasound clinic of Omderman Maternity hospital for obstetric and gynecology.

3-5 Inclusive criteria:

Any women presented to the ultrasound department complain of pelvic pain.

3-6 Exclusion criteria:

Any female of age under 12years or had normal pregnancy was excluded from this study.

3-7 Ultrasound device:

The ultrasound device is Toshiba SSA-370A is a black-and-white system with transabdominal probe 3-5 MHz and transvaginal probe 5-7 MHz, personal computer for data storage and analysis.

3-8 Scanning technique:

3-8-1 Trans abdominal scan:

In this research This is the first scanning technique used for all women with pelvic pain and done in the flowing sequences , the patient lying flat, supine, with exposed abdomen, then with trans abdominal probe applied vertically in the suprapubic area for longitudinal view of the uterus, urinary bladder and cul-de-sac, then the probe tilted 90degree to obtain the transverse view of uterus, urinary bladder, ovaries, and adenxa, and the cul-de-sac, Then probe shifted to right epicoderium for fluid in moreson pouch and ascites.

3-8-2 Trans vaginal scan:

This approach is used in this research when the transabdominal scan failure to peck up acquired diagnosis of pelvic pain, the transvaginal probe introduced vertically into the vagina by gentile rocking maneuver, the longitudinal view of the uterus is taken, then the probe rotated 90 degree for the cross sectional view of the uterus and deviated to the right side for viewing the right adenxa, and to the left for the left adenxa.

3- 9 Data collection:

Using a special data collection sheet (questionnaire), sample of 50 patients of age above 12 years and had pelvic pain were studied trans abdominal endovaginal ultrasound scanning and data was collected using a data collecting sheet which designed to evaluate patient age, marital state, presence or absence of masses , presence or absence of infertility, presence or absence of free fluid in cul-de-sac.

3-10 Data analysis:

The data is analyzed by using Statistical Package for the Social Sciences (SPSS). Using frequency tables, crosstab, bar plots, to inter present the variables and found relationship between them.

3-11 Ethical approval:

The ethical approval was granted from the hospital and the radiology department; which include commitment of no disclose of any information concerning the patient identification.

Chpater Four Results

Table (4.1) frequency distribution of age group

Age group	Frequency	Percent	Valid Percent	Cumulative Percent
15-25 years	16	32.0	32.0	32.0
26-35 years	18	36.0	36.0	68.0
36-45 years	7	14.0	14.0	82.0
46-55 years	3	6.0	6.0	88.0
56-65 years	5	10.0	10.0	98.0
66-75 years	1	2.0	2.0	100.0
Total	50	100.0	100.0	
Minimum= 17 years ,maximum= 70years,mean=34.1000,std= 13.73				

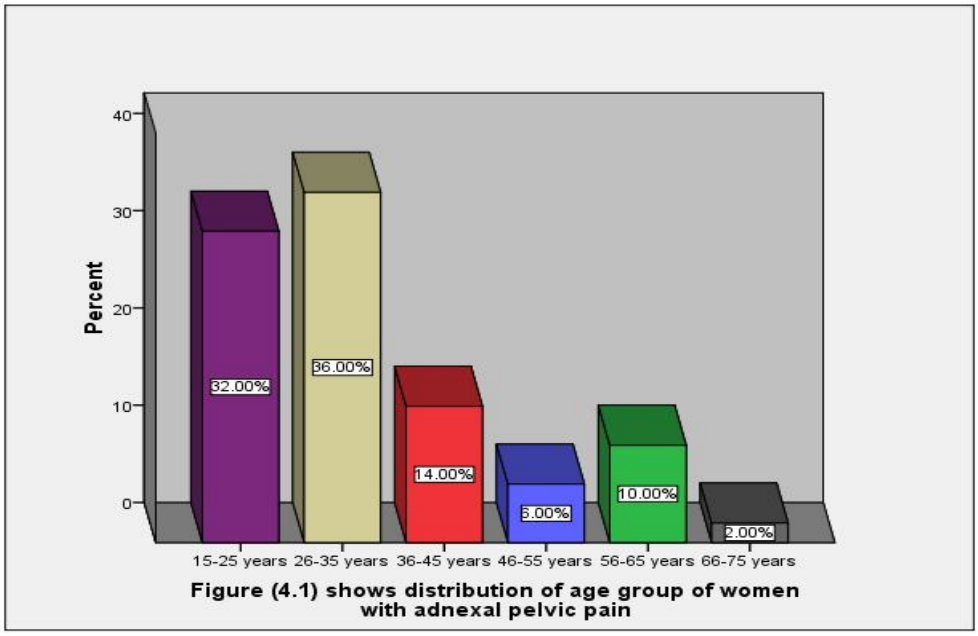

Figure (4.1) shows distribution of age group of women with adnexal pelvic pain

Table (4.2) Shows marital status distribution

Marital status	Frequency	Percent	Valid Percent	Cumulative Percent
Married	43	86.0	86.0	86.0
Unmarried	7	14.0	14.0	100.0
Total	50	100.0	100.0	

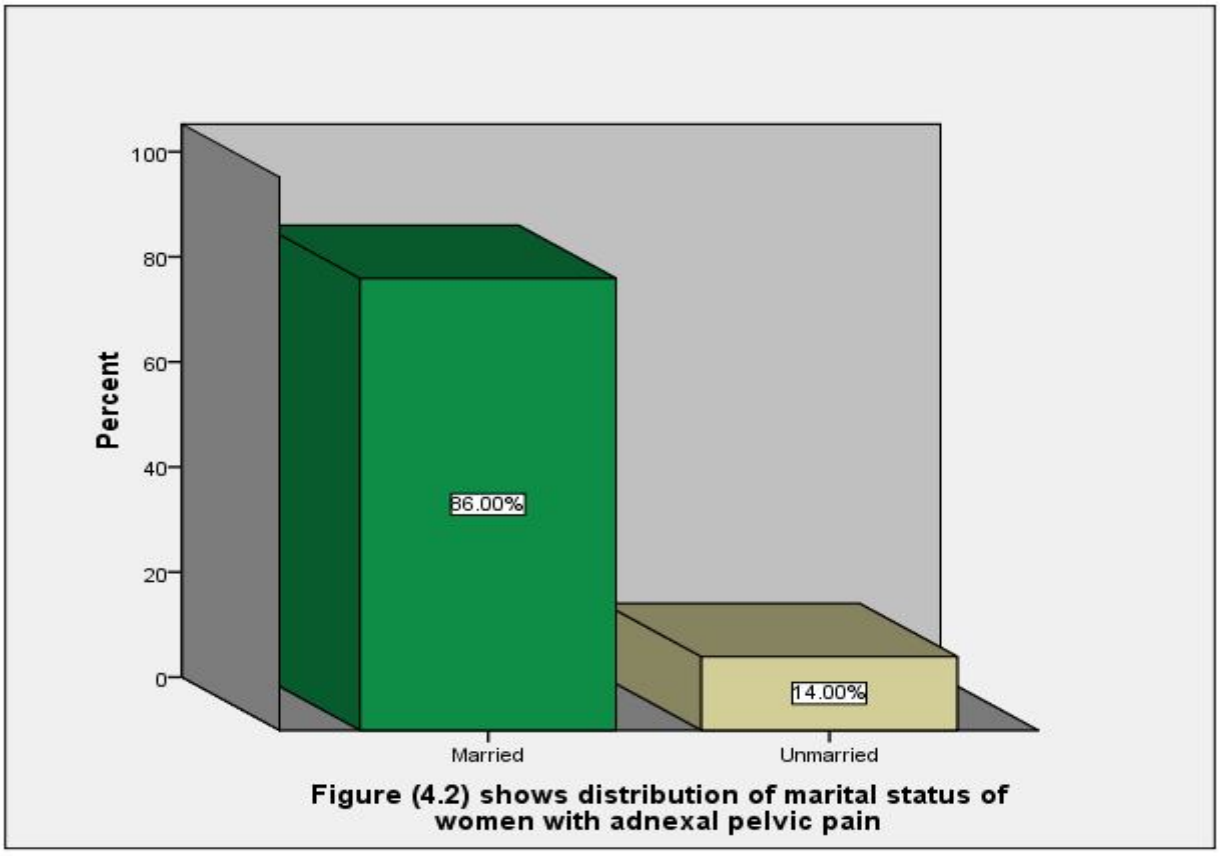

Figure (4.2) shows distribution of marital status of women with adnexal pelvic pain

Table (4.3) Shows signs and symptoms distribution

Sign and symptoms	Total	Frequency	Percentage
Pelvic pain	50	50	100%
Fever	50	30	60%
Vaginal discharge	50	30	60%
Vaginal bleeding	50	13	26%
Dysparunea	50	19	38%
Menorrhagia	50	8	16%
Dysmenorrhea	50	27	54%
Painful bowel movement	56	22	44%
Nausea	50	16	32%

Table (4.4-a) Shows ultrasound findings distribution

Ultrasound findings	Total	Frequency	Percentage
Ill defined uterine border	50	24	48%
Thick irregular endometrium	50	22	44%
Pyosalpinx	50	1	2%
Hydrosalpinx	50	5	10%
Fluid collection in cal de Sac	50	24	48%
Multicystic and solid comples adnexal mass	50	25	50%
Complete loss of border of all adnexal strucures	50	5	10%
Anechoic cystic structure with posterior enhancement	50	12	24%

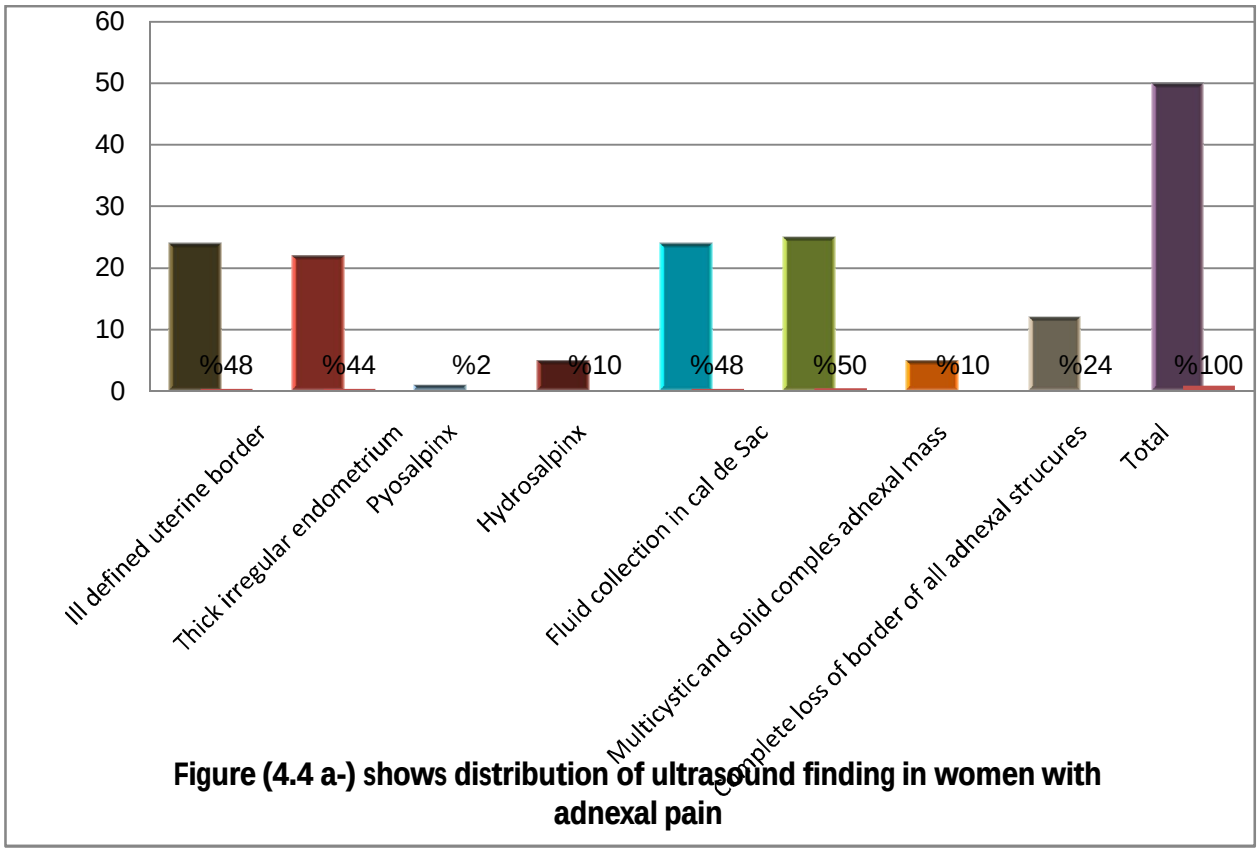

Figure (4.4 a-) shows distribution of ultrasound finding in women with adnexal pain

Table (4.4 b) Shows ultrasound findings distribution

Ultrasound finding s	Frequency	Percent	Valid Percent	Cumulative Percent
anechioc cystic structure	4	8.0	8.0	8.0
fluid collection in cal de sac	3	6.0	6.0	14.0
fluid collection in cal de sac multicystic and solid complex adnexal mass	3	6.0	6.0	20.0
ill defined uterine border ,anechoic cystic structure	1	2.0	2.0	22.0
ill defined uterine border, thick irregular endometrium, cal de sac fluid collection,multicystic and solid complex adnexal massmass	1	2.0	2.0	24.0
ill defined uterine border,multicystic and solid complex adnexal mass	5	10.0	10.0	34.0
ill defined uterine border,pyosalpinx ,hydrosalpinx,multicystic and solid complex adnexal mass	1	2.0	2.0	36.0
ill defined uterine border,thick irregular endometrium ,fluid collection in cal de sac	11	22.0	22.0	58.0
ill defined uterine border,thick irregular endometrium ,hydrosalpinx,fluid collection in cal de sac	4	8.0	8.0	66.0
ill defined uterine border,thick irregular endometrium ,multicystic and solid complex adnexal mass	2	4.0	4.0	70.0

ill defined uterine border,thick irregular endometrium,fluid collection in cal de sac ,multicystic and solid complex adnexal mass	1	2.0	2.0	72.0
multicystic and solid complex adnexal mass	11	22.0	22.0	94.0
thick irregular endometrium, cal de sac fluid collection,multicystic and solid comlex adnexal massmass	1	2.0	2.0	96.0
thick irregular endometrium, fluid collection in cal de sac	2	4.0	4.0	100.0
Total	50	100.0	100.0	

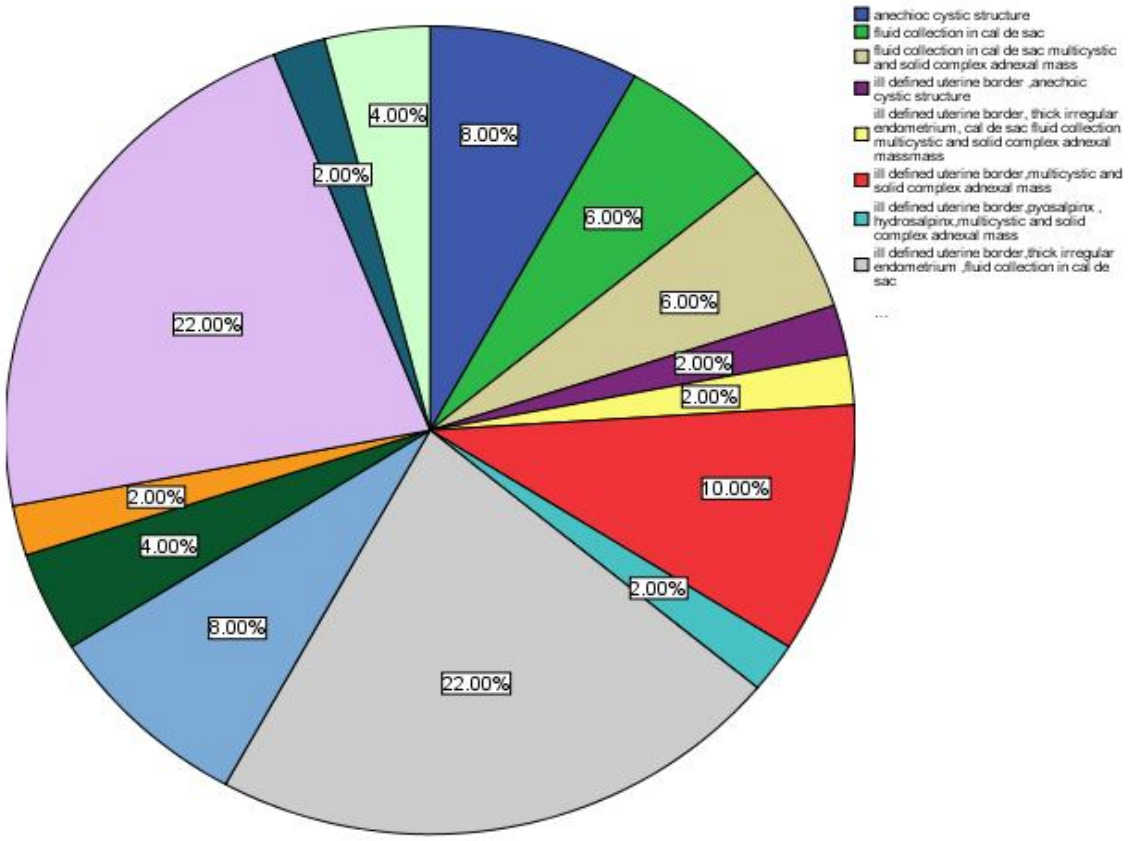

Figure (4.4-b-) Shows ultrasound findings distribution

Table (4.5) distribution of final diagnosis for women with adnexal pelvic pain

Final diagnose	Frequency	Percent	Valid Percent	Cumulative Percent
PID	21	42.0	42.0	42.0
Mass	18	36.0	36.0	78.0
Ectopic pregnancy	4	8.0	8.0	86.0
Cyst	7	14.0	14.0	100.0
Total	50	100.0	100.0	

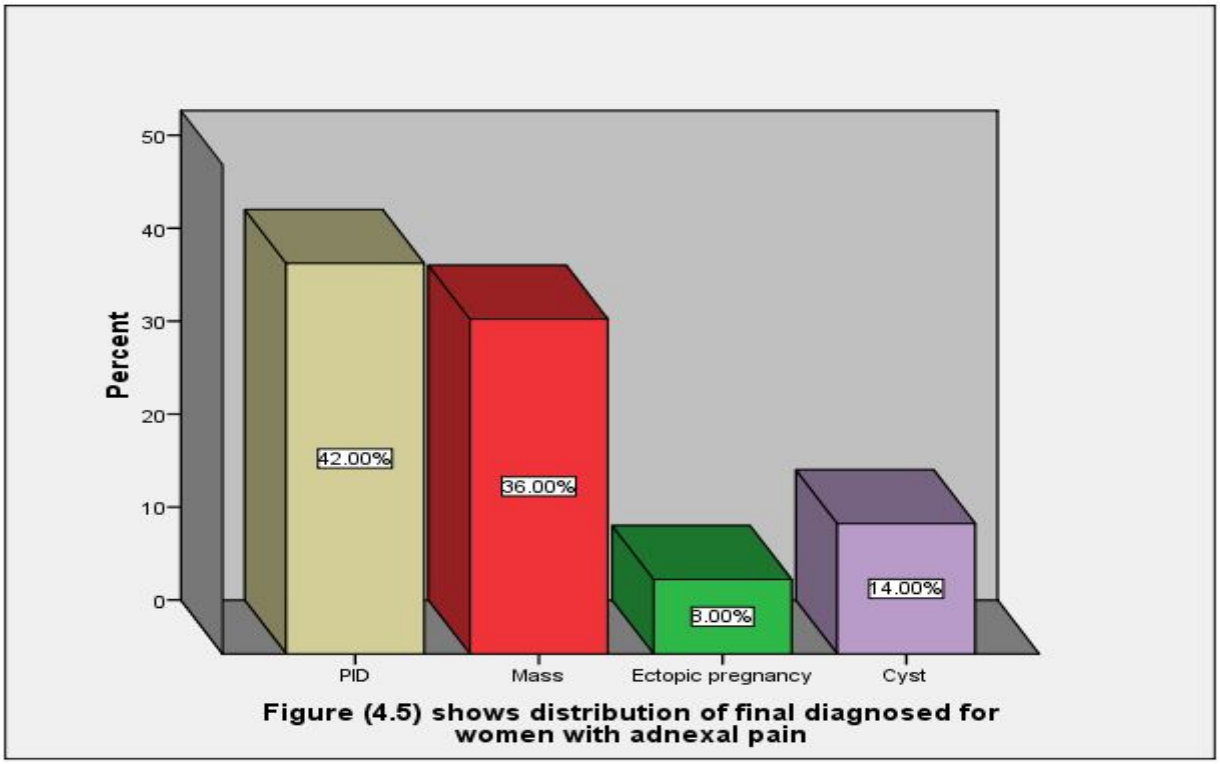

Figure (4.5) shows distribution of final diagnosed for women with adnexal pain

Table (4.6) a- cross tabulation sign and symptoms and final diagnosed of the patients.

Sign and symptoms	PID	Mass	Ectopic pregnancy	Cyst	Total
bowel pain ,fever,pain,discharge,bleeding,dysparunea,menorrhagia, dysmenorrhea,infertility	1	0	0	0	1
bowel pain,fever,pain,discharge,bleeding,dysparunea,dysmenorrhea	1	0	0	0	1
bowel pain,fever,pain,discharge,bleeding,dysparunea,menorrhagia,dysmenorrhea,infertility	0	0	0	1	1
bowel pain,pain,menorrhagia,dysmenorrhea,infertility	1	0	0	0	1
fever ,infertility,nausea,bowel pain	0	1	0	0	1
fever,pain ,discharge,bowel pain	0	1	0	0	1
fever,pain ,discharge,dysmenorrhea,nausea,bowel pain	0	1	0	0	1
fever,pain ,discharge,nausea,bowel pain	0	2	0	0	2
fever,pain,bowel pain	0	1	0	0	1
fever,pain,discharge,bleeding,dysparunea,,dysmenorrhea ,infertility	1	0	0	0	1
fever,pain,discharge,bleeding,dysparunea,dysmenorrhea ,infertility	2	0	0	0	2

fever,pain,discharge,dysmenorrheal	2	0	0	0	2
fever,pain,discharge,dysparunea,dysmenorrhea	1	0	0	0	1
fever,pain,discharge,dysparunea,dysmenorrhea,infertilit y	4	0	0	0	4
fever,pain,discharge,dysparunea,menorrhagia,dysmenor rhea	1	0	0	0	1
fever,pain,discharge,dysparunea,menorrhagia,dysmenor rhea,infertility	1	0	0	0	1
fever,pain,dysmenorrhea,infertility	0	1	0	0	1
fever,pain,menorrhagia,bowel pain	0	0	0	1	1
fever,pain,nausea,bleeding	0	0	1	0	1
fever,pain,nausea,bowel pain	0	5	0	0	5
fever,pain,nausea,dysmenorrheal	0	1	0	0	1
pain,bleeding	0	0	1	0	1
pain,bowel pain	0	1	0	0	1
pain,discharge	0	0	0	2	2
pain,discharge, bleeding ,dysparunea,dysmenorrhea, infertility	1	0	0	0	1
pain,discharge,,dysparunea,dysmenorrhea	1	0	0	0	1
pain,discharge,bleeding	0	0	0	2	2
pain,discharge,dysparunea,dysmenorrhea	2	0	0	0	2
pain,discharge,dysparunea,dysmenorrhea,infertility	1	0	0	0	1
pain,discharge,menorrhagia	0	0	0	1	1
pain,discharge,nausea,bleeding	0	0	1	0	1
pain,dysmenorrheal	0	2	0	0	2
pain,dysparunea,menorrhagia,dysmenorrhea,infertility	1	0	0	0	1

pain,nausea,bleeding	0	0	1	0	1
pain,nausea,bowel pain	0	2	0	0	2
Total	21	18	4	7	50

Table (4.6) b- chi square test between sign and symptoms and final diagnosed

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.500 E2[a]	102	.001
Likelihood Ratio	120.946	102	.097
N of Valid Cases	50		
a. 140 cells (100.0%) have expected count less than 5. The minimum expected count is .08.			

Table (4.7)a- cross tab age group and final diagnosed

	Final diagnosed				Total
	PID	Mass	Ectopic pregnancy	Cyst	
15-25 years	6	6	2	2	16
26-35 years	11	2	2	3	18
36-45 years	4	2	0	1	7
46-55 years	0	3	0	0	3
56-65 years	0	4	0	1	5
66-75 years	0	1	0	0	1
	21	18	4	7	50

Ultrasound finding	Final diagnosed				Total
	PID	Mass	Ectopic pregnancy	Cyst	
Anechioc cystic structure	0	0	0	4	4
fluid collection in cal de sac	3	0	0	0	3
fluid collection in cal de sac multicystic and solid complex adnexal mass	0	0	3	0	3
ill defined uterine border ,anechoic cystic structure	0	0	0	1	1
ill defined uterine border, thick irregular endometrium, cal de sac fluid collection,multicystic and solid complex adnexal massmass	0	1	0	0	1
ill defined uterine border,multicystic and solid complex adnexal mass	0	5	0	0	5
ill defined uterine border,pyosalpinx ,hydrosalpinx,multicystic and solid complex adnexal mass	0	1	0	0	1
ill defined uterine border,thick irregular endometrium ,fluid collection in cal de sac	11	0	0	0	11
ill defined uterine border,thick irregular endometrium ,hydrosalpinx,fluid collection in cal de sac	4	0	0	0	4
ill defined uterine border,thick irregular endometrium ,multicystic and solid complex adnexal mass	0	2	0	0	2
ill defined uterine border,thick irregular	0	0	1	0	1

endometrium,fluid collection in cal de sac ,multicystic and solid complex adnexal mass					
multicystic and solid complex adnexal mass	0	9	0	2	11
thick irregular endometrium, cal de sac fluid collection,multicystic and solid comlex adnexal massmass	1	0	0	0	1
thick irregular endometrium, fluid collection in cal de sac	2	0	0	0	2

Table (4.7) b- chi square test age group and final diagnosed

	Value	fd	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.968[a]	15	.215
Likelihood Ratio	23.224	15	.080
Linear-by-Linear Association	.251	1	.616
N of Valid Cases	50		
a. 20 cells (83.3%) have expected count less than 5. The minimum expected count is .08.			

Table (4.8) b- chi square test between ultrasound findings and final diagnosed

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.338E2[a]	39	.000
Likelihood Ratio	110.515	39	.000
N of Valid Cases	50		
a. 56 cells (100.0%) have expected count less than 5. The minimum expected count is .08.			

Table (4.9) correlation between age and final diagnosed

		age	Final diagnosed
Age	Pearson Correlation	1	.073
	Sig. (2-tailed)		.612
	N	50	50
Final diagnosed	Pearson Correlation	.073	1
	Sig. (2-tailed)	.612	
	N	50	50

Chapter Five

Discussion, conclusion and recommendation

5-1 Discussion:

Study found that: The mean age of patients under study was 26-35years (table 4-1) and married women were more affected than non married (Table 4-2).

The clinical signs of pelvic pain as shown in (table 4-3) usually fever and vaginal discharge 30 patients (60%), dysmenorrhea 27 patients (54%), pain full bowel movement 22 patients (44%), dysurea 19 patients (38%), nausea 16 patients (32%), vaginal bleeding 13 patients (26%) and menorrhagia 8 patients (16%). In table 4-5 shows frequency distribution of final diagnosis for women with pelvic pain study show that the more causes was PID 21 patients (42%), masses 18 patients (36%), cyst 7 patients (14%) and ectopic pregnancy 4 patients (8%) same result achieved by **Paul S.Kruszka MD** 2010 . Cross tabulation between signs and symptoms with final diagnosis study found that patients with PID usually had pelvic pain, fever, vaginal discharge, dysmenorrhoea , dysparunea associated with or without infertility ,vaginal bleeding and painful bowel movement .while patient with masses usually had fever, pelvic pain ,nausea and painful bowel movement associated with or without dysmenorrhoea and infertility. Patients with ectopic pregnancy usually had pelvic pain ,vaginal bleeding,nausea.patient with cyst usually had pelvic pain vaginal bleeding vaginal discharge associated with or without bowel pain, fever ,menorrhagea and infertility (Table 4-6-a).

Cross tabulation between age group and final diagnosis study shows that age between 26-35 years was more common affected by PID, mass occurred between 15-25 years of age ,ectopic pregnancy 15-35years age and cyst usually occurs in 26-35years age group (Table 4-7-a) same result achieved by **Sandra.J.Allison, MD 2012** .

Cross tabulation between ultrasound findings and final diagnosed study show that ultra sound in PID usually had ill define uterine border, thick irregular endometrium ,fluid collection in cul-de-sac associated with or without hydrosalpinx ,multicystic and solid complex mass .patient with mass usually had multi cystic and solid complex adnexal mass associated with or without ill defined uterine border, fluid in cul-de-sac and hydro salpinx .patient with ectopic had fluid in cul-de-sac ,multicystic and solid mass with or without ill defined uterine border ,thick irregular endometrium, patient with cyst had anechoic cystic structure multicystic and solid mass with or without ill define uterine borders(Table 4-8-a) .

In table (4-6b)-(4-7b)-(4-8) there was strong significant difference between signs and symptoms and final diagnosis of adnexal pelvic pain causes, P value 0.0001.There was no significant difference between age and final diagnosed of causes of adnexal pelvic pain P value 0.215.There was strong significant between ultrasound finding and final diagnosed of causes of adnexal pelvic pain P value 0.000

5-2 Conclusion:

This research was approved it is hypothesis that Ultrasound was more accurate tool for detection of female pelvic pain causes.

The age group26-35 years and married women were more affected by pelvic pain than other age groups and non married women.

The clinical signs of pelvic pain usually fever with vaginal discharge, dysmenorrhea, painful bowel movement, dysurea, nausea with vaginal bleeding and menorrhagia.

The main causes of pelvic pain in women was PID, pelvic masses , cyst and ectopic pregnancy respectively.

The ultrasound findings in PID usually ill define uterine borders, thick irregular endometrium , fluid collection in cul-de-sac associated with or without hydrosalpinx , multicystic and solid complex mass. but patients with pelvic mass usually had multi cystic and solid complex adnexal mass associated with or without ill defined uterine borders, fluid in cul-de-sac and hydro salpinx and U/S findings in ectopic pregnancy cases were fluid in cul-de-sac , multicystic and solid mass with or without ill defined uterine borders and thick irregular endometrium, while U/S findings in cases of cyst were anechoic cystic structure, multicystic and solid mass with or without ill define uterine borders.

There was strong significant correlation between signs and symptoms with final diagnosis of adnexal pelvic pain causes and between ultrasound findings and final diagnosed of causes of adnexal pelvic pain, but there was

no significant correlation between age and final diagnosed of causes of adnexal pelvic pain.

5-3 Recommendations:

- Study recommended that married female of age group (50 years or greater) with pelvic pain were advised to do U/S scanning initially to detect the cause of pain, because U/S is cheap, safety and reliable than tPSA.

- TheGovernment should introduce the trans vaginal ultrasound machines and increase the training institutes of ultrasound for increasing the sonologists skills and experiences

- The author recommended that the government should be increase the specialist hospitals for urology diseases because they increased in Sudan nowadays.

- According to the high cost of scientific research which the researcher was faced, the government should appeal universities in Sudan and companies to support the researchers in order to improve plans of treating and management of such diseases.

- Further studies should be carried out in this field on many aspects such as increasing the number of patients, to show the relation between pelvic pain and infertility, comparing between the role of U/S scanning and other diagnostic tools, using a trans vaginal ultra sonographic approach and color Doppler ultrasonography.

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