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Evaluation of the Pattern of Sonographic Detectable Adnexal Masses in a Nigerian Teaching Hospital

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Abstract
BACKGROUND: *Adnexal mass is a common cause of morbidity and mortality worldwide. Ultrasound scan is the mainstay in detecting pelvic adnexal mass.*
OBJECTIVE: *To evaluate sonographic detectable adnexal masses among women undergoing gynaecological ultrasound scan at University of Maiduguri Teaching Hospital (UMTH).*
METHODS: *This was a non-experimental retrospective study carried out at radiology department UMTH. Data was collected using convenient sampling method and was grouped into positive and negative ultrasound findings. The data was analysed using SPSS version 17.0 statistical software.*
RESULTS: *Total of 300 subjects were recruited for the study. 15.7% or 1 in every 6 patients (1:6) ultrasound detectable adnexal masses was reported. Youngadult (20-40 years) had the highestadnexal mass (9.7%).*
CONCLUSION: *This study has established the various pattern and occurrence of ultrasound detectable adnexal masses seen at radiology department UMTH.*

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I. Introduction

Pelvic ultrasonography (US) remains the imaging modality most frequently used to detect and characterize adnexal masses. Although evaluation is often aimed at distinguishing benign from malignant masses, the majority of adnexal masses are benign. About 90% of adnexal masses can be adequately characterized with US alone [1].Ultrasonography (US) continues to be the primary imaging modality used to identify and characterize adnexal masses [2].The extensive use of ultrasound in the examination and assessment of the female pelvis may be attributed to many reasons. It is non-invasive, never contraindicated in any patient and not as expensive as some other diagnostic imaging modalities, usually available in most hospitals. However, it is very operator dependent. Gynaecologic ultrasound is usually requested to confirm the normality or otherwise of the female reproductive organs [3]. The word adnexa simply mean structures which are in close proximity to a part. For instance adnexa oculi is the lacrimal apparatus, adnexa uteri is the ovaries and fallopian tubes [4]. Adnexal masses can be divided into four basic groups: (a) single cystic mass; (b) multiple cystic masses; (c) complex masses; and (d) solid masses. With the clinical information and a follow-up examination, a relatively specific diagnosis can be made [5].While transabdominal US is helpful for larger masses or those located superiorly or laterally in the pelvis, transvaginal US provides optimal visualization of most adnexal diseases. Real-time US observations contribute to improved characterization [6] and suggest value in recording video clips[6]. Two-dimensional US remains the mainstay for pelvic US, though three-dimensional US is being used with increasing frequency. Little formal comparison of the two techniques is currently available, but three dimensional US has not been shown to be superior to two-dimensional US in characterizing adnexal masses [7]. Three-dimensional US may have some value in determining the origin of an adnexal mass [8]. Doppler US is useful in cases with an apparent solid area or septum and will be discussed subsequently. Contrast material-enhanced US remains an investigational technique [7].It is easier to assign the adnexal mass to one of to the five

categories described by Osmers and co-workers: (1) Cystic (2) Biloculated (3) Multiloculated (4) Complex and (5) Solid. A mass is considered complex if it contains solid elements or thick or irregular septations, or if ascites is noted [9]. Thesecategories are shown in Figures 1, 2, 3, 4, and 5.

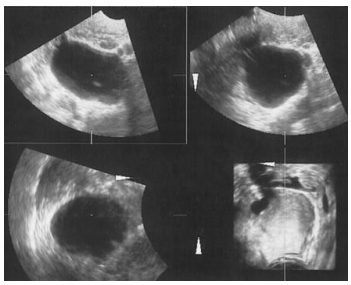


Figure 1: A simple 4cm cyst in a premenopausal woman. The image in the bottom right is a rendering of a portion of the inner cyst wall (From reference 9)

Figure 2: A biloculated 6cm mass in a premenopausal woman. The upper cyst, which is filled with low-level echogenicity, is typical of the pattern seen in endometriotic cysts. (From reference 9)

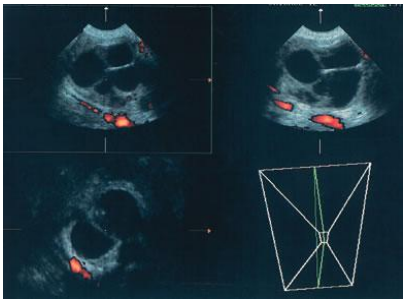


Figure 3: A 3-dimensional study in a perimenopausal patient identified a multiloculated 3.5cm cyst. Power Doppler examination was unremarkable. Surgery revealed a benign cystadenoma. (From reference 9)

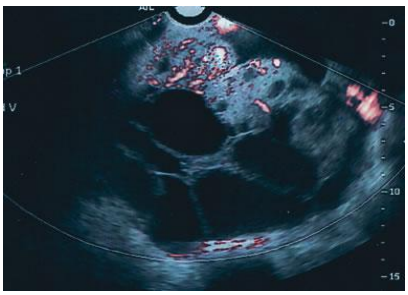


Figure 4: A complex 12 × 10cm mass in a premenopausal woman contained multiple septations with solid elements that had marked vascular flow. The mass was correctly identified as malignant (Stage III papillary adenocarcinoma). (From reference 9)

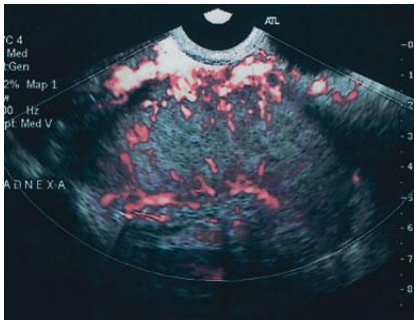


Figure 5: A highly vascular 8 × 6cm solid mass in this postmenopausal patient was a Stage III poorly differentiated adenocarcinoma. (From figure 9)

Once the mass has been characterized into one of Osmers's five categories, a histologic differential should be provided if appropriate. It is noted that many persistent ovarian cysts found in premenopausal women can be accurately identified by their characteristic echo-patterns as endometriomas or cystic teratomas using transvaginal ultrasound [10]. In nonpregnant women from age 20 to 40, functional cysts, haemorrhagic cysts, endometriomas, and cystic teratomas will account for close to 90% of the ovarian masses seen in the average clinician's office practice [11].

II. Methods

A series of 300 female patients that underwent gynaecological sonography at UMTHwith 47 adnexal masses identified by sonography was studied retrospectively over 24-months period. A total of 206 were premenopausal (12-53 years old; mean, 33 years), 94 were postmenopausal (44-60 years old; mean, 52 years). Sonography was performed with a 3.5 MHz sector transducer for initial transabdominal imaging. Large masses also were evaluated with a 3.0 MHz linear transducer for a more accurate estimation of size.

This research was a retrospective non experimental study and a secondary source of data was used for the study(ultrasound record book of UMTH).The following data was extracted and recorded on a data capture sheet:

1. Various indications from the referring clinicians.
2. Various sonographic findings observed in each patient during the examination.
3. Age groups of the patients

The longitudinal (L), anteroposterior (D) and transverse(W) diameters of each tumour were measured from the frozen ultrasound image. The tumour volume was calculated from the formula: $L \times D \times W \times 0.5$ cm^3. After completing the gray-scale scan, the sonographer classified each tumour as benign ovarian masses and benign extra-ovarian masses.

A. The following are categorised underbenign ovarian masses:

1. **A simple cyst** (defined as having anechoic fluid, a thin wall, no solid area or septa, and distal acoustic enhancement) is usually easily recognizable (Fig. 6).

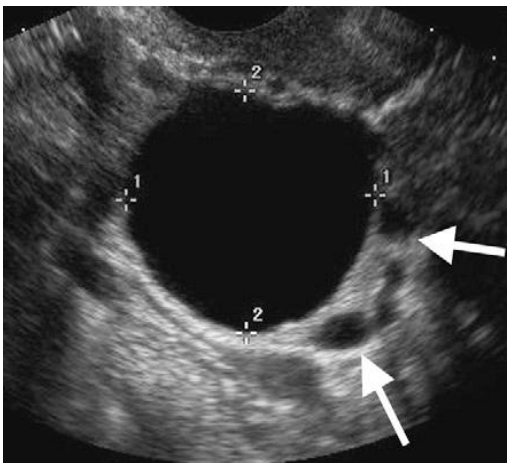


Figure 6: Transvaginal US scan reveals a 3.5cmsimple ovarian cyst (callipers). Normal-appearing ovarian tissue (arrows) with a few follicles around the periphery confirms the ovarian origin of the cyst

2. **A corpus luteum cyst:** It is important to recognize the corpus luteum as a normal finding and not mistake it for disease. This physiologic structure develops after ovulation and is typically less than 3 cm in diameter. It may appear as a cystic mass with a slightly thick, crenulated wall and internal echoes or as a subtle isoechoic or minimally hypoechoic solid-appearing area due to haemorrhage and/or wall thickening [12]. While the corpusluteum is usually avascular centrally, colour or power Doppler US will oftendepict hypervascularity around its periphery, sometimes referred to as a "ring of fire" (Fig. 7).

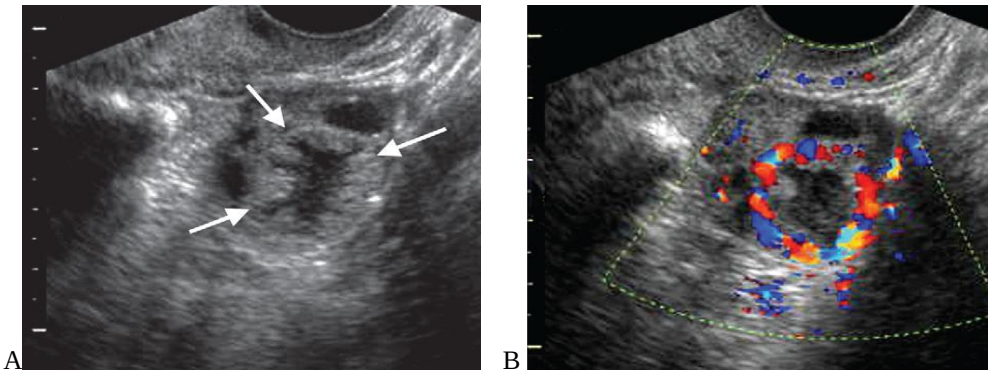


Figure 7: Transvaginal US scan demonstrates a typical appearanceof a corpus luteum within the ovary. It has a slightly thick, crenulated wall (arrows) and a small cystic centre. (b) Colour Doppler US scan shows abundant flow in the wall of the corpus luteum.

2.**Haemorrhagic ovarian cysts**: Haemorrhagic ovarian cysts are likely caused by bleeding into a corpus luteum (Fig. 8A). The majority have typical US features that allow a confident diagnosis to be made [13].While a clot may occasionallysimulate a solid nodule, it is usually recognizable by its concave outer margin and/or absence of detectable flow at colour or power Doppler US (Fig. 8B). Follow-up US scans are useful if one is not confident. Blood clot can sometimes be recognized on a gray-scale US scan by its jellylike movement when pressure is applied with the transducer [14]. A fluid level occasionally occurs in a haemorrhagic cyst [15].

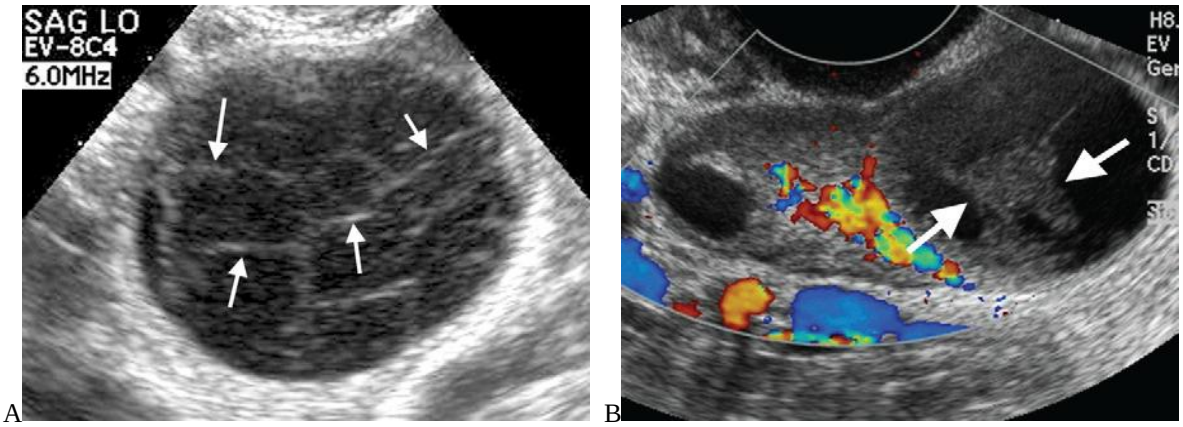


Figure 8:(A) Haemorrhagic cyst. Sagittal transvaginal US scan demonstrates a complex ovarian cyst with internal echoes. There is a reticular pattern to the internal echoes due to fibrin strands (arrows). (B) Haemorrhagic cyst. Sagittal transvaginal colour Doppler US scan shows a complex cystic mass within the periphery of the ovary.

3. Endometriomas: Endometriomas (Fig. 9) typically appearas complex cysts, either unilocular or multilocular, that have a ground glass appearance due to diffuse, homogeneous, low to medium level internalechoes [14]. Similar diffuse internal echoes may sometimes occur in other lesions such as haemorrhagic cysts, dermoids, and some ovarian carcinomas [16]. An endometrioma is verylikely when there are diffuse internal echoes in a cystic mass lacking other US features [17].Additional features reported withendometriomas include echogenic foci in the wall and small solid areas along the wall, as discussed previously [18].

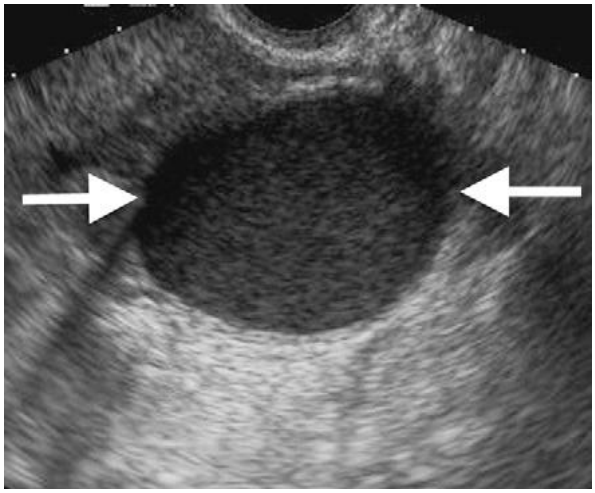


Figure 9: Endometrioma. Transvaginal US scan reveals a complex ovarian cyst (between arrows) with homogeneous internal echoes.

4. Mature cystic teratomas: Mature cystic teratomas often referred to as dermoids or dermoid cysts, are usually easily recognized at US (14). A hyperechoic area (Fig 10) is a highly predictive feature of a dermoid, particularly when it is associated with distal acoustic shadowing [19, 20].

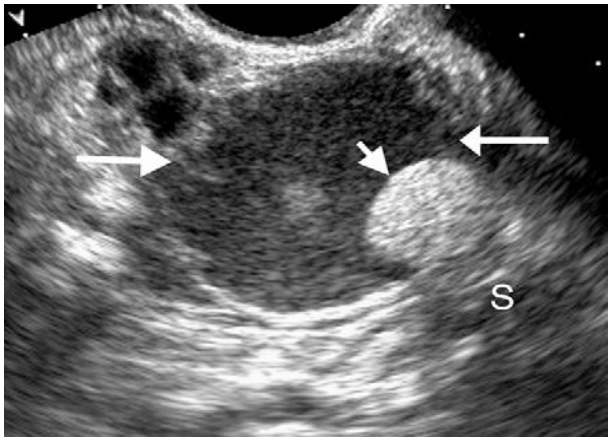


Figure 10: Mature cystic teratoma. Transvaginal US scan shows a complex ovarian cyst (long arrows) with low-level internal echoes and a markedly hyperechoic solid-appearing area (short arrow) with faint distal acoustic shadowing *(S).*

B. The following are categorised underbenign extraovarian masses:

1. Paraovarian cysts: Paraovarian cysts usually occur in thebroad ligament and arise from paramesonephric,mesothelial, or mesonephricremnants [21].They are usually simplecysts and are easily recognized if a separate ipsilateral ovary is identified.

2. Hydrosalpinx:A hydrosalpinx should be suspected onthe basis of its location and configuration. Characteristically, it is a tubularshaped cystic structure that is separate from the ipsilateral ovary. Its configuration may reveal indentations on the opposite sides of the wall (Fig. 11), referred to as the "waist sign," which is a strong predictor of hydrosalpinx [21].

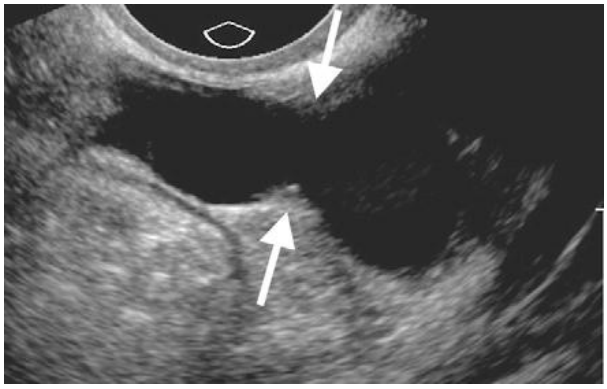
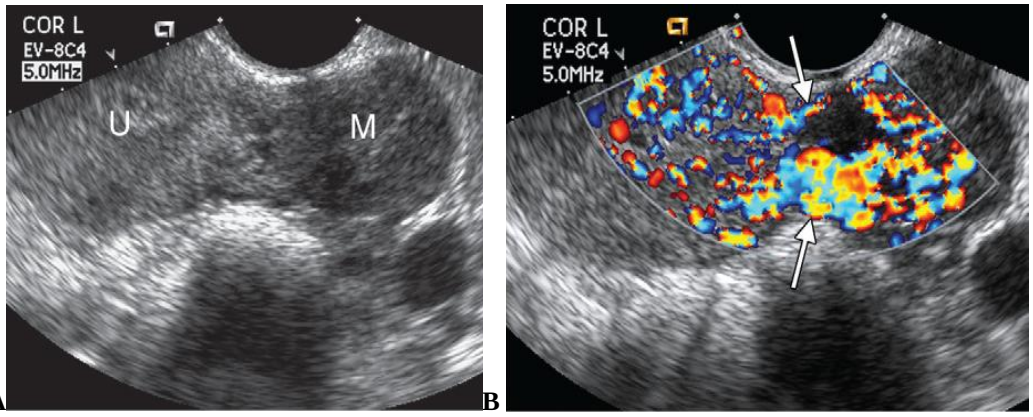


Figure 11: Hydrosalpinx. Transvaginal US scan shows a tubular-shaped cystic mass. The finding of indentations (arrows) on opposite sides of the tubular mass, termed the *waistsign*, is a good indicator of a hydrosalpinx.

Pedunculated Uterine Leiomyoma: These are typically solid masses (Fig 12)that may be mistaken for an ovarianfibroma if one does not identify a separateipsilateral ovary. Colour or power DopplerUS demonstration of a vascularpedicle connecting the mass to theuterus is good evidence of a pedunculated fibroid [22, 23].



A **B**

Figure 12: Pedunculated. (A) Coronal transvaginal US scandemonstrates a solid adnexal mass *(M)* adjacent to the left side of theuterus *(U).* (B) Colour Doppler US scan in the same plane shows connecting vessels (arrows) between the uterus and mass, helping to confirm a pedunculated leiomyoma.

III. Results

The data collected was categorized according to indications and findings. Frequency and percentage were however calculated.

Table 1 shows the frequency distribution of various age groups. It revealed that adolescence of age 12 – 19 years had the highest percentage 35.7% (n=107) while young adult age 20 – 40 years were the least represented 29% (n=89).

Table 1: FREQUENCY DISTRIBUTION OF VARIOUS AGE GROUPS.

AGE	FREQUENCY	PERCENTAGE
ADOLESCENCE (12 – 19)	107	35.7
YOUNG AULT (20 – 40)	89	29.7
MID ADULT (41 – 60)	104	34.7
TOTAL	300	100

Table 1 shows the frequency of occurrence in various age groups. It revealed that adolescence of 12 – 19 years had the highest in occurrence, 35.7% (n=107) while young adult of 20 – 40 years had the least in occurrence, 29% (n=89).

TABLE 2: OCCURENCE OF ULTRASOUND FINDINGS OF ADNEXAL MASSES IN VARIOUS AGE GROUPS.

AGE	POSITIVE FINDINGS	NEGATIVE FINDINGS	TOTAL
ADOLESCENCE (12– 19)	15 (5%)	92 (30.7%)	107(35.7)
YOUNG AULT (20 – 40)	29 (9.7%)	60 (20%)	89(29.7)
MID ADULT (41 – 60)	3 (1%)	101 (33.7%)	104(34.7)
TOTAL	47 (15.7%)	253 (84.3%)	300(100%)

Table 3 revealed that 107 (35.7%) of the patients were adolescence of 12 – 19 years among which 92 (30.7%) were sonographically negative while 15 (5%) were sonographically positive. 89 (29.7%) of the patients were young adult of 20 – 40 years among which 60 (20%) were sonographically negative while 29 (94%) were sonographically positive. 104 (34.7%) of the patients were mid – adult of 41 – 60 years among which 101 (33.7%) were sonographically negative while 3(1%) were sonographically positive.

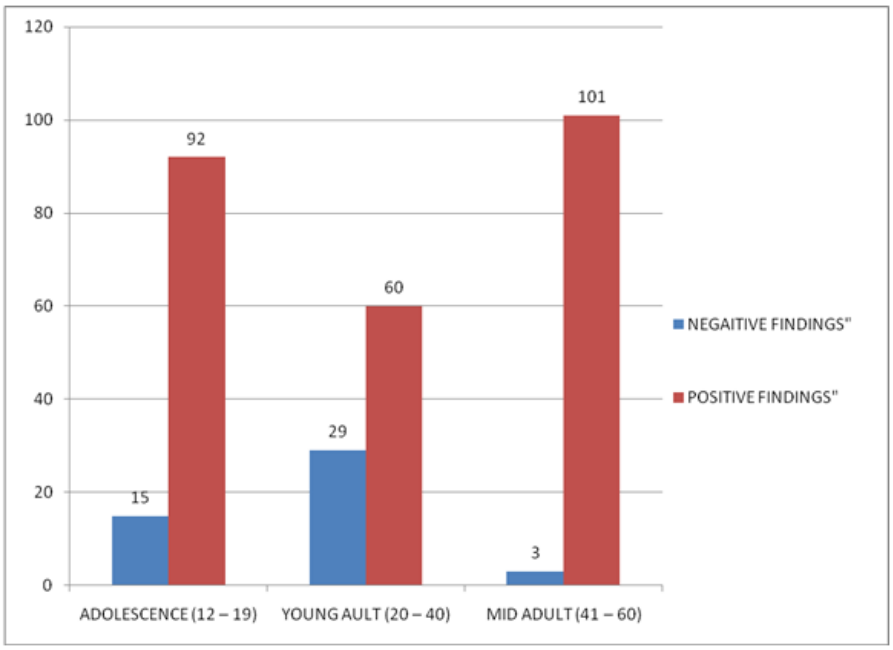


Figure 13:A BAR CHARTSHOWS POSITIVE AND NEGATIVE ULTRASOUND FINDINGS AMONG VARIOUS CATEGORY OF PATIENTS.

Clinical history of queried adnexal masses appeared to be the highest yield for adnexal masses while amenorrhoea appeared the least. Meanwhile, clinical history of lower abdominal pain yielded the highest negative findings, followed by amenorrhea.

TABLE 3: SHOWS CLINICAL AND ULTRASOUND FINDINGS

CLINICAL FINDINGS	POSITIVE ULTRASOUND FINDINGS	NEGATIVE ULTRASOUND FINDINGS
RIGHT/LEFT ILIAC FOSSA PAIN	9	51
QUERRIED ADNEXAL MASS	26	28
INFERTILITY	5	47
AMENORRHOEA	2	63
LOWER ABDOMINAL PAIN	5	64
TOTAL	47	253

Table 4 shows that queried adnexal masses appeared to be the highest yield for adnexal masses while infertility and lower abdominal pain appeared to be the least yield for adnexal masses. Also lower abdominal pain appeared to be the highest negative findings while queried adnexal masses appeared to be the least negative findings.

TABLE 4: SHOWS CLLINICAL FINDINGS AND VARIOUS LOCATIONS OF ULTRASOUND DETECTABLE ADNEXAL MASSES.

CLINICAL FINDINGS	RIGHT ADNEXA	LEFT ADNEXA	BOTH ADNEXAE
RIGHT/LEFT ILIAC FOSSA PAIN	7	2	0
QUERRIED ADNEXAL MASS	21	3	2
INFERTILITY	4	1	0
AMENORRHOEA	2	0	0
LOWER ABDOMINAL PAIN	2	2	1
TOTAL	36	8	3

Table 5 shows that, there was higher incidence of adnexal masses in the right ovary than the left and least incidence in both ovaries. Adnexal masses are more frequent in cases of queried adnexal masses while least frequent in amenorrhoea at the right ovary while in the left ovary is more frequent in queried adnexal masses while least frequent in infertility and no incidence in amenorrhoea. The frequency was also higher in queried adnexal masses of both ovaries while least in lower abdominal pain, and no frequency in iliac fossa pain, infertility and amenorrhoea.

TABLE 4: SHOWS BENIGN OVARIAN AND EXTRAOVARIAN MASSES INVARIOUS LOCATIONS OF ULTRASOUND DETECTABLE ADNEXAL MASSES.

CLINICAL FINDINGS	RIGHT ADNEXA	LEFT ADNEXA	BOTH ADNEXAE
RIGHT/LEFT ILIAC FOSSA PAIN	Simple cyst = 5 Haemorrhagic cyst = 2	Simple cyst = 2	0
QUERRIED ADNEXAL MASS	Simple cyst = 10 Haemorrhagic cyst = 7 Endometriomas = 2 Teratomas = 2	Teratomas = 1 Haemorrhagic cyst = 2	Simple cyst = 2
INFERTILITY	Hydrosalpinx = 2 Simple cyst = 2	Endometriomas = 1	0
AMENORRHOEA	Corpus Luteum cyst = 1 Endometrioma = 1	0	0
LOWER ABDOMINAL PAIN	Hydrosalpinx = 1 Pedunculated Uterine Leiomyoma = 1	Simple cyst = 1 Teratomas = 1	Simple cyst = 1
TOTAL	36	8	3

IV. Discussion

Gynaecological sonography is an important investigation usually requested by referring clinicians for various reasons.This research work shows different types of gynaecological sonographic findings at UMTH.This will give the referring clinicians clue of how to further improve management of patients with pelvic adnexal masses.

It is difficult to estimate the true prevalence of adnexal masses in the general population studied, as the sample size was too small.

The result of this study shows that the prevalence of ultrasound detectable adnexal masses was 15.7% or 1 in every 6 patients (1:6) proven positive. The findings is in agreement, though slightly lower than the findings of feldesman *et a*l who reported the pattern and occurrence of ultrasound detectable adnexal masses as18.4%.The adnexal masses were more frequent in the age group of 20-40 followed by 12-19 years. This accounted for 14.7% of total adnexal masses (15.7%) in the study with only 1% in the age range of 41-60 years. This findings is in contrast with that of Frederick*et al* whose findings were 116 per 1769 population and the highest percentage were postmenopausal women.

This study confirmed that the highest positive findings of adnexal masses were patients queried of having adnexal mass while the least were patient queried of having amenorrhoea and there was higher incidence in the right ovary of 39 out of 47 per 300 population and least incidence in the left ovary of 8 out of 47 per 300 population. This is in agreement with the study carried out by Phyllis *et al* who reported that out of 1942 women, 272 had adnexal masses in the right ovary, 249 had adnexal masses in the left ovary and 22 had adnexal masses in both ovaries. The study also revealed that 4 (1.3%) out of 36 (12%) were unilateral benignextraovarian masses on the right adnexa while on the left adnexa were all unilateral benign ovarian masses 8 (2.7%). Only 3 (1%)out of 36 (12%) presented with bilateral benign ovarian masses.

V. Summary Of Findings

The study has succeeded in establishing the following findings:

1. The evaluation of the pattern and occurrence of pelvic adnexal masses among women undergoing gynaecological sonography at UMTH

2. There was no significant incidence of adnexal masses at UMTH among patients sonographically diagnosed of adnexal masses with 15.7% or 1 in every 6 patients (1:6).
3. The age group that had the highest occurrence was age 20-40 years, while age 41-60 years had the least.
4. There were significant difference between the clinical and ultrasound findings in right/left iliac fossa pain, infertility, lower abdominal pain and amenorrhoea.
5. The research also succeeded in categorising the adnexal masses into benign ovarian masses and benign extraovarian ovarian masses.

VI. Conclusion

This study has established the various pattern and incidence of ultrasound detectable adnexal masses seen at radiology department UMTH which can be useful for further research and planning.

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References

[1]. American College of Radiology. ACR AppropriatenessCriteria 2008: clinically suspected adnexal mass.American College of Radiology Web site. Available at:http://www.acr.org/SecondaryMainMenuCategories/quality_safety/app_criteria/pdf/ExpertPanelonWomensImaging/SuspectedAdnexalMassesDoc11.as.
[2]. Accessed April 9, 2009.
[3]. Liu J, Xu Y, Wang J. Ultrasonography, computed tomography and magnetic resonance imaging for diagnosis of ovarian carcinoma. Eur J Radiol 2007; 62: 328-334.
[4]. Oluwakemi O. Obstetrics and Gynaecology ultrasound. 1st edition,UK: Elsevier limited, 2005; 244-245.
[5]. Bega G, Toaff AS and Kane P. Three dimensional ultrasonography in gynaecogy. J Ultrasound Med. 2003; 22: 244-245.
[6]. Valentin L, Ameye L, Jurkovic D, et al. Which extrauterine pelvic masses are difficult to correctly classify as benign or malignant on the basis of ultrasound findings and is there a way of making a correct diagnosis? Ultrasound Obstet Gynaecol 2006; 27: 438 – 444.
[7]. Van Holsbeke C, Yazbek J, Holland TK, et al. Real-time ultrasound versus evaluation of static images in the preoperative assessment of adnexal masses Ultrasound Obstet Gynecol 2008 ; 32 : 828 – 831.
[8]. Alcazar JL . New ultrasound-based technologies for predicting ovarian cancer in adnexal masses. CurrWomens Health Rev 2007;3: 89 – 94.
[9]. BenacerrafBR, Benson CB, Abuhamad AZ,et al. Three- and 4-dimensional ultrasound in obstetrics and gynecology: proceedings of the American Institute of Ultrasound in Medicine Consensus Conference . J Ultrasound Med 2005;24: 1587-1597.
[10]. Osmers R, Osmers M, von Maydell B et al: Preoperative evaluation of ovarian tumors in the premenopausal by transvaginal sonography. Am J Obstet Gynecol 175:428,1996.
[11]. Jermy K, Luise C, Bourne T: The characterization of common ovarian cysts in premenopausal women. Ultrasound Obstet Gynecol 17: 140, 2001.
[12]. Cohen L, Sabbagha R: Echo-patterns of benign cystic teratomas by transvaginal ultrasound. Ultrasound Obstet Gynecol 3: 120, 1993.
[13]. Brown DL. A practical approach to the ultrasound characterization of adnexal masses. Ultrasound Q 2007;23: 87 – 105.
[14]. Patel MD, Feldstein VA, Filly RA. The likelihood ratio of sonographic findings for the diagnosis of haemorrhagic ovarian cysts. J Ultrasound Med 2005;24: 607 – 614, quiz 615.
[15]. Valentin L. Use of morphology to characterize and manage common adnexal masses. Best Pract Res Clin Obstet Gynaecol 2004; 18: 71 – 89.
[16]. Jain KA. Sonographic spectrum of haemorrhagic ovarian cysts. J Ultrasound Med 2002; 21: 879 – 886.
[17]. Patel MD. Practical approach to the adnexal mass. Radiol Clin North Am 2006; 44: 879 – 899.
[18]. Patel MD, Feldstein VA, Chen DC, Lipson SD, Filly RA. Endometriomas: diagnostic performance of ultrasound. Radiology 1999; 210: 739 – 745.
[19]. Asch E, Levine D. Variations in appearance of endometriomas. J Ultrasound Med 2007; 26: 993 – 1002.
[20]. Caspi B , Appelman Z , Rabinerson D , Elchalal U , Zalel Y , Katz Z . Pathognomonic echo patterns of benign cystic teratomas of the ovary: classification, incidence and accuracy rate of sonographic diagnosis. Ultrasound Obstet Gynecol1996;7: 275 – 279.
[21]. Patel MD, Feldstein VA, Lipson SD, Chen DC, Filly RA. Cystic teratomas of the ovary: diagnostic value of sonography. AJR Am J Roentgenol 1998;171: 1061 -1065.
[22]. Kim JS, Woo SK, Suh SJ, Morettin LB . Sonographic diagnosis of paraovarian cysts: value of detecting a separate ipsilateral ovary. AJR Am J Roentgenol 1995; 164: 1441 – 1444.
[23]. Kim SH, Sim JS, Seong CK. Interface vessels on color/power Doppler US and MRI: a clue to differentiate subserosal uterine myomas from extrauterine tumours . J Comput Assist Tomogr2001;25: 36 – 42.
[24]. MadanR . The bridging vascular sign. Radiology 2006; 238: 371 – 372.