

ASSESSMENT OF SUSPICIOUS OVARIAN MASSES BY COMPARATIVE STUDY OF USG AND CT TECHNIQUES

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Abstract

Undoubtedly, most ovarian lesions, endometrial pathology and uterine lesions are best detected with ultrasound. Computed tomography (CT) imaging offers better diagnostic capabilities for large pelvic masses, tubo- ovarian abscesses, postoperative and postpartum complications. In some cases, Computed Tomography (CT) is employed to achieve optimal differential Diagnosis to determine the clinical pathway to follow. Hence based on above findings the present study was planned for Assessment of Suspicious Ovarian Masses by Comparative Study of USG and CT Techniques.

The present study was planned in Department of Radio- Diagnosis, Katihar Medical College, Katihar (Al-Karim University), Bihar, India. In the present study 50 females were enrolled having Suspicious Ovarian Masses. Computed tomography (CT) and USG characteristics of different lesions were noted and recorded. The histopathological diagnosis was followed up and recorded. The results of this study were analysed and compared with other available studies in literature.

The data generated from the present study concludes that Ultrasonography is usually the first imaging modality in evaluation of female patients suspected to have pelvic pathology. Computed tomography is superior diagnostic imaging modality than USG prior to treatment which improved detection and characterization of tumour due to better diagnostic accuracy and consequently reduction of invasive procedure which lead to significant reduction of mortality and morbidity from tumour.

Keywords: Ovarian Masses, Comparative Study, USG, CT Techniques, etc.

Introduction

A pelvic mass is an enlargement or swelling in the pelvic region. Most pelvic masses are discovered during routine gynecological or physical examinations. Pelvic masses may originate from either the gynecological organs, such as the cervix, uterus, uterine adnexa, or from other pelvic organs, such as the intestines, bladder, ureters, and renal organs.

An ovarian cyst is a sac filled with liquid or semiliquid material that arises in an ovary. Although the discovery of an ovarian cyst causes considerable anxiety in women owing to fears of malignancy, the vast majority of these lesions are benign. [1-2]

Many patients with simple ovarian cysts found through ultrasonographic examination do not require treatment. In a postmenopausal patient, a persistent simple cyst smaller than 10 cm in dimension in the presence of a normal CA125 value may be monitored with serial ultrasonographic examinations. [3, 6, 4]

Oral contraceptive pills (OCPs) protect against the development of functional ovarian cysts. Existing functional cysts, however, do not regress more quickly when treated with combined oral contraceptives than they do with expectant management. [7]

Persistent simple ovarian cysts larger than 10 cm (especially if symptomatic) and complex ovarian cysts should be considered for surgical removal. The surgical approaches include an open technique (laparotomy) or a minimally invasive technique (laparoscopy) with very small incisions. The latter approach is preferred in cases presumed benign. [4] Removing the cyst intact for pathologic analysis may mean removing the entire ovary, though a fertility sparing surgery should be attempted in younger women. [4] Bilateral oophorectomy and, often, hysterectomy are performed in many postmenopausal women with ovarian cysts, because of the increased incidence of neoplasms in this population.

An ovarian cyst is a sac filled with liquid or semiliquid material that arises in an ovary. The number of diagnoses of ovarian cysts has increased with the widespread implementation of regular physical examinations and ultrasonographic technology. The discovery of an ovarian cyst causes considerable anxiety in women owing to fears of malignancy, but the vast majority of ovarian cysts are benign. [5]

These cysts can develop in females at any stage of life, from the neonatal period to postmenopause. Most ovarian cysts, however, occur during infancy and adolescence,

which are hormonally active periods of development. Most are functional in nature and resolve without treatment.

However, ovarian cysts can herald an underlying malignant process or, possibly, distract the clinician from a more dangerous condition, such as ectopic pregnancy, ovarian torsion, or appendicitis. On the other hand, there may be an inverse relationship between ovarian cysts and breast cancer. [8, 9]

Abdominal pain in the female can be one of the most difficult cases to diagnose correctly in the emergency department (ED). The spectrum of gynecological disease is broad, spanning all age ranges and representing various degrees of severity, from benign cysts that eventually resolve on their own to ruptured ectopic pregnancy that causes life-threatening hemorrhage.

When presented with this scenario, the goal of the emergency physician is to rule out acute causes of abdominal pain associated with high morbidity and mortality, such as appendicitis, ovarian torsion, or ectopic pregnancy; to assess for the possibility of neoplasm or malignancy; and either to refer the patient to the appropriate consultant or to discharge them with a clear plan for follow-up with an obstetrician/gynecologist. [9]

The median menstrual cycle lasts 28 days, beginning with the first day of menstrual bleeding and ending just before the subsequent menstrual period. The variable first half of this cycle is termed the follicular phase and is characterized by increasing follicle-stimulating hormone (FSH) production, leading to the selection of a dominant follicle that is primed for release from the ovary. [10]

In a normally functioning ovary, simultaneous estrogen production from the dominant follicle leads to a surge of luteinizing hormone (LH), resulting in ovulation and the release of the dominant follicle from the ovary and commencing the luteinizing phase of ovulation.

After ovulation, the follicular remnants form a corpus luteum, which produces progesterone. This, in turn, supports the released ovum and inhibits FSH and LH production. As luteal degeneration occurs in the absence of pregnancy, the progesterone levels decline, while the FSH and LH levels begin to rise before the onset of the next menstrual period.

Different kinds of functional ovarian cysts can form during this cycle. In the follicular phase, follicular cysts may result from a lack of physiologic release of the ovum due to excessive FSH stimulation or lack of the normal LH surge at midcycle just before ovulation. Hormonal stimulation causes these cysts to continue to grow. Follicular cysts are typically larger than 2.5 cm in diameter and manifest as a discomfort and heaviness. Granulosa cells that line the follicle may also persist, leading to excess estradiol

production, which, in turn, leads to decreased frequency of menstruation and menorrhagia. [11]

In the absence of pregnancy, the lifespan of the corpus luteum is 14 days. If the ovum is fertilized, the corpus luteum continues to secrete progesterone for 5-9 weeks, until its eventual dissolution in 14 weeks' time, when the cyst undergoes central hemorrhage. Failure of dissolution to occur may result in a corpus luteal cyst, which is arbitrarily defined as a corpus luteum that grows to 3 cm in diameter. The cyst can cause dull, unilateral pelvic pain and may be complicated by rupture, which causes acute pain and possibly massive blood loss.

Theca-lutein cysts are caused by luteinization and hypertrophy of the theca interna cell layer in response to excessive stimulation from human chorionic gonadotropin (hCG). These cysts are predisposed to torsion, hemorrhage, and rupture. Theca-lutein cysts can occur in the setting of gestational trophoblastic disease (hydatidiform mole and choriocarcinoma), multiple gestation, or exogenous ovarian hyperstimulation.

These cysts are associated with maternal androgen excess in up to 30% of cases but usually resolve spontaneously as the hCG level falls. Theca-lutein cysts are usually bilateral and result in massive ovarian enlargement, a characteristic of the condition termed hyperreactio luteinalis. [12]

The prognosis for benign cysts is excellent. All such cysts may occur in residual ovarian tissue or in the contralateral ovary. Overall, 70%-80% of follicular cysts resolve spontaneously.

Malignancy is a common concern among patients with ovarian cysts. Pregnant patients with simple cysts smaller than 6cm in diameter have a malignancy risk of less than 1%. Most of these cysts resolve by 16-20 weeks' gestation, with 96% of these masses resolving spontaneously. [13] In postmenopausal patients with unilocular cysts, malignancy develops in 0.3% of cases.

In complex, multiloculated cysts, the risk of malignancy climbs to 36%. If cancer is diagnosed, regional or distant spread may be present in up to 70% of cases, and only 25% of new cases will be limited to stage I disease. [14]

Mortality associated with malignant ovarian carcinoma is related to the stage at the time of diagnosis, and patients with this carcinoma tend to present late in the course of the disease. The 5-year survival rate overall is 41.6%, varying between 86.9% for International Federation of Gynaecology and Obstetrics (FIGO) stage Ia and 11.1% for stage IV.

A distinct group of less aggressive tumors of low malignant potential runs a more benign course but still is associated with definite mortality. The overall survival rate is 86.2% at 5 years. [15] The potential of benign ovarian cystadenomas

to become malignant has been postulated but, to date, remains unproven. Malignant change can occur in a small percentage of dermoid cysts (associated with an extremely poor prognosis) and endometriomas.

Undoubtedly, most ovarian lesions, endometrial pathology and uterine lesions are best detected with ultrasound. Computed tomography (CT) imaging offers better diagnostic capabilities for large pelvic masses, tubo-ovarian abscesses, postoperative and postpartum complications. In some cases, Computed Tomography (CT) is employed to achieve optimal differential diagnoses to determine the clinical pathway to follow. Hence based on above findings the present study was planned for Assessment of Suspicious Ovarian Masses by Comparative Study of USG and CT Techniques.

Methodology:

The present study was planned in Department of Radio-Diagnosis, Katihar Medical College, Katihar (Al-Karim University), Bihar, India. In the present study 50 females enrolled having Suspicious Ovarian Masses. Computed tomography (CT) and USG characteristics of different lesions were noted and recorded. The histopathological diagnosis was followed up and recorded. The results of this study were analysed and compared with other available studies in literature.

Detailed history of allergy and renal function tests were taken before doing CT scan and if there was history of allergy then non-ionic contrast was used. Site, size, papillary projections, wall characteristics, capsular infiltrations, the presence of solid areas inside the mass and presence of ascites were recorded both by US and CT scan.

Presence of lymph node enlargements, free fluid in peritoneal cavity and omental caking were considered as supporting evidence for malignancy. Trans-abdominal sonography was carried out with Philips Epic 5g machine using 3.5 and 5 Mhz curvilinear and linear transducers. Scanning in transverse, oblique and sagittal planes were carried out and probable characterization of ovarian tumours was evaluated. CT scan of the abdomen was carried out with GE 16 Slice revolution ACT. Pre and Post IV contrast images along with oral contrast were taken in the axial planes. Thin sections of 1 – 3 mm were taken in region of interest. Evaluation of pathologies of adjacent anatomical structures was determined with the help of multi planar reconstruction. All the patients underwent surgery and specimens were collected intraoperatively and postoperatively for histopathological examination.

All the patients were informed consents. The aim and the objective of the present study were conveyed to them. Approval of the institutional ethical committee was taken prior to conduct of this study.

Following was the inclusion and exclusion criteria for the present study.

Inclusion Criteria: Only those patients willing to participate in the study were included. Patients referred to the radiology department for ovarian lesions investigation, and found to have positive findings, were included in this study. All accidentally diagnosed cases of ovarian lesions were also be included in this study.

Exclusion Criteria: Patients presenting to radiology department not willing for examination or written consent, were excluded from this study.

Results & Discussion:

Ovarian tumours present a greatest clinical challenge of all gynaecological cancers and ovarian. Carcinoma is the second most common gynaecological carcinoma in incidence. As most of them present in a late stage, clinical diagnosis alone is difficult and as benign ovarian tumours greatly outnumber malignant ones, determination of a degree of suspicion for malignant is critical and is based largely on imaging modalities.

Ultrasound and computed tomography plays an important role in the diagnosis, preoperative staging, and evaluation of tumour recurrence of ovarian carcinoma. Ovarian carcinoma has characteristic tumour appearances and modes of tumour spread within the peritoneal cavity. By recognizing these features, the radiologist can assist the clinicians in treatment planning. As benign ovarian tumours greatly outnumber the malignant ones determination of a degree of suspicion for malignancy is critical and is largely based on imaging modalities. Based on few studies already done, some say that ultrasound is an excellent method for preoperative screening and is the most practical modality readily available and has high negative predictive value for the diagnosis of ovarian tumours.

Ultrasound is the imaging modality of choice for the female pelvis. It can determine the organ or site of abnormality and provide a diagnosis or short differential diagnosis in the vast majority of patients. Doppler sonography helps assess normal and pathologic blood flow. Doppler ultrasound can also distinguish vascular structures from nonvascular structures, such as dilated fallopian tubes or fluid-filled bowel loops. The trans abdominal approach visualizes the entire pelvis and gives a global overview. Its main limitations involve the examination of patients unable to fill the bladder, obese patients, or patients with a retroverted uterus, in whom the fundus may be located beyond the focal zone of the transducer. The trans abdominal technique also is less effective for characterization of adnexal masses. High-resolution imaging of transvaginal ultrasound provides high diagnostic accuracy for pelvic pathology. Because of

the proximity of the transducer to the uterus and adnexa, transvaginal sonography allows the use of higher frequency transducers, producing much better resolution, which provides better image quality and anatomic detail.

Table 1: Basic Details

Parameters	No. of Cases
Age:	
21 – 30 years	2
31 – 40 years	4
41 – 50 years	15
51 – 60 years	20
61 & above years	9
Pelvic Pathology:	
Endometrial	11
Ovarian	12
Cervical	27
Total	50

Table 2: Comparison of USG & CT

Type of Finding	Ultrasound	CT
Benign	5	4
Malignant	44	45
Suspiciously Malignant	1	1
Total	50	50

Table 3: Association of Masses

Diagnosis by CT	Diagnosis by USG							Total
	Carcinoma of Cervix	Carcinoma of Endometrium	Carcinoma of Ovary	Fibroid	GTN	Simple Cyst		
Carcinoma of Cervix	22	0	0	0	0	0	22	
Carcinoma of Endometrium	1	8	0	0	0	0	9	
Carcinoma of Ovary	0	0	15	0	0	0	15	
Fibroid	0	0	0	1	0	0	1	
GTN	0	0	0	0	1	0	1	
0	0	0	0	0	0	2	2	
Total	23	8	15	1	1	2	50	

Jeong et al. [16] examined the accuracy of grey scale ultrasound in delineating a malignant ovarian mass based on size and appearance. In that study fixed septa, tumor size exceeding 5cm, and multiloculations were considered warning for ovarian malignancy. The results of our study showed that morphological characteristics associated with strong probability of malignancy were the presence of solid component (63%), papillary projection (92%), and free fluid in peritoneal cavity (56%). Another study done by Onyka et al. showed comparative diagnostic values of grey-scale US versus CT Scan in the primary management of gynecological pelvic mass with emphasis on ovarian cancer detection and staging. The sensitivity of CT scan for all ovarian cancer detection was greater than that of TAUS 83% vs. 67%, but TAUS was more specific. Both methods were equally efficacious in detecting and staging advanced ovarian cancer cases. Over all CT did not offer significant additional features and did not result in a change in

management plan in any of the patients reviewed. Both methods were almost equally efficacious in detecting ovarian cancer cases. [17]

The determination of a degree of suspicion for malignancy in an ovarian mass is the most significant step in its management as the decision to perform radical surgery or conservative surgery depends on accurate pre-operative diagnosis. [18] Clinical evaluation with regards to site (unilateral or bilateral), fixity, consistency, presence of nodules in Douglas pouch and presence of ascites increase the suspicious of malignancy to certain extent but if combined with other tools as tumor markers and two dimensional ultrasounds, the sensitivity for malignancy increases. [18-19] Among women with ovarian disorders, CT has been used primarily in patients with ovarian malignancies, either to assess disease extent prior to surgery or as a substitute for second look laparotomy. CT is preferred for identification of peritoneal implants, lymphadenopathy and extent of the disease. However, studies failed to demonstrate that CT is significantly superior to other modalities in characterization of ovarian cancer. [20-22] And moreover, simple ovarian cysts are better evaluated by ultrasound.

Ultrasound is the imaging modality of choice for the female pelvis. It can determine the organ or site of abnormality and provide a diagnosis or short differential diagnosis in the vast majority of patients. Doppler sonography helps assess normal and pathologic blood flow. Doppler ultrasound can also distinguish vascular structures from nonvascular structures, such as dilated fallopian tubes or fluid-filled bowel loops. The trans abdominal approach visualizes the entire pelvis and gives a global overview. Its main limitations involve the examination of patients unable to fill the bladder, obese patients, or patients with a retroverted uterus, in whom the fundus may be located beyond the focal zone of the transducer. The trans abdominal technique also is less effective for characterization of adnexal masses. High-resolution imaging of transvaginal ultrasound provides high diagnostic accuracy for pelvic pathology. Because of the proximity of the transducer to the uterus and adnexa, transvaginal sonography allows the use of higher frequency transducers, producing much better resolution, which provides better image quality and anatomic detail.

Conclusion:

The data generated from the present study concludes that Ultrasonography is usually the first imaging modality in evaluation of female patients suspected to have pelvic pathology. Computed tomography is superior diagnostic imaging modality than USG prior to treatment which improved detection and characterization of tumour due to better diagnostic accuracy and consequently reduction of

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