

# Comparison of Diagnostic Efficacy of Female Pelvic Masses with Ultrasonography and Computed Tomography

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**Abstract:** *Gynecological pelvic masses have recently become more prevalent. However, the majority of women were unaware of pelvic masses until they were found during a routine gynaecological checkup. The main goal of the study is to see how well diagnostic imaging methods like computed tomography and ultrasonography help narrow down the list of possible diagnoses for patients who come in with abdominal pain or a mass, giving doctors the information they need to treat the patients properly. **Methods:** The study was conducted over a two-year period, from October 2020 to October 2022. Most of the 50 female patients in the study who went to the radiology department with lower abdomen pain and irregular periods were between the ages of 35 and 50. All patients who received ultrasound examinations had any lumps that were deemed sonographically ambiguous or potentially malignant further examined using a CT scan. **Results:** Of the 50 masses discovered in 50 individuals, 40 were benign, 08 were malignant, and 2 had no real mass at all. Sonography and the final diagnosis did not agree well with the origin of 50 masses, although CT and the final diagnosis agreed quite well. In 30 (48%) cases, sonography was able to identify the mass's origin; in 32 (52%) cases, it was unable to do so. Sonography couldn't tell for sure in 12 cases of uterine masses whether the mass was a solid ovarian tumour or a pedunculated fibroid because it was hard to tell. Two masses that were sonographically questioned had unfavourable results. On a CT scan, one of these was the loops of feces-filled intestine that stood out on an ultrasound and looked like a solid mass. In 93% of the masses examined by CT scan, the origin could be identified. The one tumour that was mistakenly identified as an ovarian cancer was the one tumour that was of ovarian origin. **Conclusion-** Due to the outstanding soft tissue contrast and organ-specific information produced in the pelvis, CT is noticeably superior to US in every way in diagnosing pelvic masses.*

**Keywords:** Pelvic Mass, Ultrasound, Computed Tomography

## 1. Introduction

Gynecological tumours rank among the most common causes of mortality in India. These tumours are very rare in their early stages, and by the time they are found, they have already outgrown.

When malignant neoplasms are found to be advanced, they can be very difficult to treat. Gynecological pelvic masses have recently become more prevalent. Statistics show that 20% of women will experience a pelvic mass at some point during their lives. However, the majority of women were unaware of pelvic masses until they were found during a routine gynaecological checkup. Radiologists find it hard to figure out what's wrong with female pelvic masses because they involve so many different organs. Therefore, it is

essential to get a preoperative diagnosis when treating individuals with pelvic masses. (1) The potential for cancer encourages us to look for an early, accurate, and quick diagnosis to lower mortality and morbidity. The variety of diagnostic approaches for female pelvic masses has changed as a result of the discovery and use of diagnostic ultrasound (USG) <sup>(1, 2)</sup>. The ability to determine the soft tissue architecture and characterise female pelvic masses has changed thanks to multiplanar computed tomography (CT). <sup>(3)</sup>

A functional uterus and ovaries make up the anatomical female genital system. The adnexa is made up of wide ligaments and fallopian tubes. <sup>(1)</sup> Pelvic masses can be solid (fibroma), cystic (cystadenoma), or mixed (dermoid).

### Leiomyoma



Figure showing - 49 years old woman presented with post menopausal bleeding. TAS showed a well defined polypoid echogenic area within the endometrial cavity. TVS confirmed that it was a submucosal fundal fibroid

### Hydatidiform Mole



Figure showing 21 year old female came for a routine mAtal scan. Sonography revealed a molar pregnancy.

### Bicornua TE Uterus with Hematometra



Figure Showing - A 23 year old unmarried lady presented with irregular menses and dysmenorrhea. USG right adnexal lesion revealed bicornuate unities uterus .Right horn contained hematometra

**Serous cystadenoma**

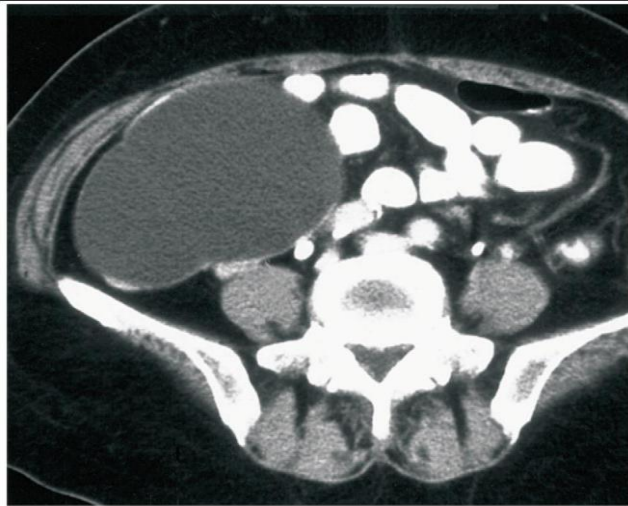


Figure Showing- 27 year old presented with irregular menstruation. Sonography revealed a large cystic area in the pelvis ovaries were not well visualized. CT Scan showed a unilocular right ovarian cyst

**Mucinous Cystadenoma**



Figure of CT showing multicystic mass with hyperdense contents likely mucin with calcific septations (arrow heads)

**CA Endometrium**



Several imaging methods have been used to predict the pelvic mass before surgery. Imaging methods like computed tomography and ultrasonography have a hard time giving a clear diagnosis in this case because the disease is so widespread. Adnexal masses in particular present a special diagnostic challenge because benign adnexal masses outnumber malignant ones by a large margin. It's important to figure out if there's a chance of cancer, and this is mostly based on how accurate the imaging is.

Imaging methods, especially computed tomography (CT) and ultrasonography (US), are now needed to diagnose and treat pelvic diseases. Ultrasound is accepted as the primary imaging

modality because it is accessible, inexpensive, and radiation-free. A CT scan is normally reserved for cases where an ultrasound is unreliable. The adnexa can be accurately predicted for benignity by ultrasonography, despite the fact that it is not very good at identifying malignancy. Because of its multiplanar capabilities and ability to precisely characterize the soft tissue architecture, CT has become an essential tool in the assessment of masses. In this way, it is likewise superior to ultrasonography. It helps identify the source of the pelvic mass. Consequently, mass characterization is enhanced, resulting in more accurate diagnoses.

But when the disease has spread outside of the pelvis, a CT scan can find both peritoneal lymph nodes and metastases in the liver. The main goals of this study are to look at how well ultrasound and computed tomography can find and classify female pelvic masses based on their histology and to compare how well they do this.

## 2. Literature Survey

Bhimani et al<sup>1</sup>, concluded ultrasound by virtue of non-invasiveness, lack of radiation hazard and by ability to demonstrate structural changes in organ is investigation of choice in ovarian pathology and it can easily detect solid to cystic lesions and characterize the size, shape and extent of lesion. Computerized Tomography is particularly useful to know the enhancement pattern of the lesion, density and extent and staging of malignancies.

Khandhedia et al<sup>2</sup>, observed CT scan was more sensitive than ultrasonography, but sonography is more specific than CT scan in diagnosis of malignant lesions. Paltiel et al<sup>3</sup>, shown ultrasound to be a powerful imaging tool for most clinical indications related to the pediatric female pelvis. Most pathology within the pediatric pelvis is well delineated with ultrasound. This is particularly true in patients with pelvic pain in whom ultrasound usually obviates the need for CT and the attended ionizing radiation.

Douglas et al, interpreted that the overwhelming majority of pelvic masses are benign and most can be recognized on the basis of characteristic US features. Twickler et al<sup>3</sup>, reported that US characteristics can be used to diagnose the classic-appearing nonneoplastic entities, benign neoplasms and malignancies. In cases in which the appearance of pelvic mass is not classic, assignment of relative risk of malignancy using a multiparametric model is appropriate and beneficial for patient management. Yan Liu et al, demonstrated that the combined application of ultrasound and CT has incremental value in accurately detecting pelvic mass over either method alone.

Iyer et al, depicted that for pelvic lesions which are indeterminate on ultrasound, CT increases the specificity of imaging evaluation, thus decreasing benign resections. CT is useful in diagnosis and treatment planning of advanced cancer.

Shaaban et al, observed that the malignant ovarian germ cell tumors spread in the same manner as epithelial ovarian neoplasms but are more likely to involve regional lymph nodes. Preoperative imaging may depict local extension, peritoneal disease, and distant metastases.

Rathore et al, concluded that the sensitivity of CT and USG for diagnosing malignancy of pelvic lesions is similar. However, due to better specificity and lower false positivity rate, higher sensitivity in detecting invasion of adjacent organs, CT may be considered complimentary for optimal patient management and can be used in the assessment of problematic cases

Menon et al<sup>10</sup>, interpreted that the sensitivity of the multimodal screening and ultrasound screening strategies is encouraging. Specificity was higher in the USS group, resulting in lower rates of repeat testing and surgery

## 3. Methods

### Type of Study

This study was prospective and cross-sectional.

### Place of Study

The research was conducted in the Department of Radiology, Kalinga Institute of Medical Sciences, Bhubaneswar.

### Duration of Study

The study was conducted over a two-year period, from October 2020 to October 2022.

### Patients

Most of the 50 female patients in the study who went to the radiology department with lower abdomen pain and irregular periods were between the ages of 35 and 50. All patients who complained of pain or a lump in their belly were admitted to the appropriate departments, where a brief clinical history was obtained along with a fast physical assessment using the proforma provided below. A preliminary diagnosis was determined based on the medical history and examination results. Patients were transported to the Radiology department and underwent an ultrasonogram after the standard blood and urine tests. All patients who received ultrasound examinations had any lumps that were deemed sonographically ambiguous or potentially malignant further examined using a CT scan. The following techniques were used to determine the final diagnoses for each of the 50 patients: surgical results, histopathology, imaging follow-up, and clinical follow-up.

### Patients Preparation

Informed consent was taken from all patients before they were enrolled in our study.

## 4. Result/ Discussion

Our prospective study confirms previous reports suggesting that US imaging and CT scan study is helpful in the evaluation of pelvic pathological entities. In spite of a tumour whose sonography was questioned, our investigation found 51 final benign diagnoses, of which 2 were genuinely normal CT results. It is important to let patients know that a sonographically identified tumour is not cancerous but rather a normal structure; this helps them avoid surgery, needless follow-up imaging, and worry. Because of these things, CT should be the next step when the results of sonography aren't clear.

Our work shows that the first crucial step in defining a pelvic mass—identifying the origin of the mass—is difficult to do using sonography. For instance, whereas a solid mass inside the uterus is most certainly a fibroid, a solid mass next to the

uterus may be an ovarian tumour or a pedunculated uterine fibroid. A second contributing element to an uncertain sonographic diagnosis was the size of the large mass. Sonography can't figure out what's wrong with these huge solid masses in the pelvis until certain signs of fibroids, like refractory shadowing, are found.

In contrast to sonography, CT and the eventual proven origin of a mass showed (table I) great agreement. This emphasises the value of using a CT scan to evaluate such a tumour rather than exposing a patient to surgery that might not be necessary. Our analysis further showed that two sonographically detected ambiguous masses were really low-lying bowels filled with faeces rather than masses. The characterization of uterine abnormalities is ideally suited for CT. The colon can be marked and stretched using an oral contrast agent, and CT can assist in distinguishing between the gut and peritoneal implants.

According to our research, sonography performs poorly when it comes to precise tissue characterisation (table II), the second crucial factor in describing an adnexal mass, while CT performs quite well. On sonography, benign tumours can occasionally seem complicated and imitate a cancer.

More accurate diagnoses made by CT in situations flagged by US as worrisome may prevent the need for surgery or otherwise alter care by revealing benignity. These tests are done to make it easier to diagnose benign lumps that appear complicated on ultrasound and to allow for less intrusive treatment. Increased visibility of key imaging findings, such as the presence of solid components (or vegetations) in a cystic lesion and necrosis in a solid lesion, is what has led to the enhanced characterisation.

It is advised that ultrasound continues to be the major imaging modality for the assessment of a clinically suspected pelvic mass based on accepted practise and a literature review. Great-frequency transvaginal probes have helped to provide pictures with excellent quality and high resolution. TVUS makes interior features of masses visible, enabling a precise diagnosis. When the results of the ultrasound exam aren't clear, a CT scan is the next step that will save the most money especially MD CT CT provides a number of benefits. It can be done quickly and quite simply, and it is generally available. Also, a CT scan of the abdomen or pelvis makes it possible to get a good look at the main tumour site and any possible places where peritoneal implants or lymphadenopathy could be. The ability to distinguish between peritoneal implants and the colon using an oral contrast agent provides CT with a significant advantage over ultrasound and CT imaging.

The most effective application of CT is to assess the severity of illness in the pelvis and abdomen. According to certain studies, CT may quite accurately identify individuals who may have tumour implants that can be best surgically debulked.

The main benefit of CT imaging is its capacity to integrate some of the most advantageous aspects of both US and CT

into a thorough evaluation. The whole pelvis may be thoroughly examined with MR, much like with CT, and anomalies of the bone, muscle, peritoneum, lymph nodes, and pelvic sidewall can be seen. CT imaging, like in the US, allows for direct multiplanar imaging; however, CT imaging has more flexibility in this area because the planes are not constrained by the available sonographic windows, as they are in the US. Contrast chemicals can be utilised with CT imaging to spot cysts, tumour necrosis, and regions of solid tissue. The most significant difference between CT and US and MR imaging is that soft-tissue contrast is naturally very high with MR imaging.

Outwater and Dunton found that because of questionable sonography readings, needless surgery was carried out in 50–67% of benign cases. The radiologist's biggest issue is figuring out which pelvic tumours are benign and which are cancerous. Following the discovery of a pelvic mass, particular therapy based on imaging or biochemical laparoscopy or laparotomy results is given, as well as clinical follow-up. Potentially malignant masses are those that are big and complicated, have solid components, are cystic, and don't go away after a series of US exams timed to the menstrual cycle. For suspected adnexal masses, laparotomy with excision has long been advised, most benign adnexal masses having been removed. Some less intrusive approaches to assessing these lesions have been given some thought. Duplex Doppler US examination, CT imaging, laparoscopy, and CA 125 tests are examples of less invasive methods for determining the presence of cancer. The goals of these tests are to make it easier to find benign tumours that look complicated on US and to make treatment less invasive. As pelvic mass treatment options get more complex and patient-specific, preoperative assessments of a lesion's location, size, and chance of malignancy are becoming more crucial. CT is effective for further lesion characterization for masses that are sonographically ambiguous. The discovery of a benign aetiology by CT may eliminate the necessity for surgery in situations that the US deems suspicious or otherwise modifies care.

**Table I:** Table showing % of Origin detection

| Origin of Lesion | No. of Lesions | % of Lesion |
|------------------|----------------|-------------|
| Sonography       | 30             | 48          |
| CT Scan          | 13             | 93          |

**Table II:** Table showing percentage of Characterization of Lesion

| Characterization of Lesion | No. of Lesions | % of Lesion |
|----------------------------|----------------|-------------|
| Sonography                 | 31             | 50          |
| CT Scan                    | 12             | 86          |

## 5. Conclusion

According to the study, ultrasound, which is currently the first imaging technique used to investigate pelvic disease, has a poor ability to characterise lesions in the female pelvis and can only reliably pinpoint the lesion's tissue of origin in 48% of instances. Due to the outstanding soft tissue contrast and organ-specific information produced in the pelvis, CT is

noticeably superior to US in every way. In the pelvis, the tissue contrast offered by CT has no particular technique-based benefits. Due to the CT gan's better soft tissue resolution and multi-planar ability, which lead to higher accuracy rates, we tell all patients with a pelvic abnormality found on US or a strong clinical suspicion of disease to get one.

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