

ROLE OF ULTRASOUND IN EVALUATION OF PELVIC MASSAswin Kumar R¹, M. Adaikappan², P. Gunasekaran³, S. Sethurajan⁴**HOW TO CITE THIS ARTICLE:**

Aswin Kumar R, M. Adaikappan. P. Gunasekaran, S. Sethurajan, "Role of Ultrasound in Evaluation Pelvic Mass". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 52, October 13; Page: 12140-12154, DOI: 10.14260/jemds/2014/3603

ABSTRACT: BACKGROUND AND OBJECTIVES: Use of diagnostic ultrasound has changed the spectrum of diagnostic approach to pelvic masses. The main objective of this study is to qualify the diagnostic yield of USG in helping to narrow down the differential diagnostic in patients suspected to be suffering from pelvic lesions and guide in the appropriate management. **METHODS:** The study consisted of 50 patients who had positive findings in Ultrasonography. Patients were from both sexes. The age group comprised of Newborn to Octogenarians. After the clinical examination and routine baseline blood and urine investigations, patients were referred to the radiology department and subjected to a plain radiogram of the abdomen to be followed by an ultrasound examination. **RESULTS:** out of 50 patients, Gynecological and Obstetric related cases comprised 46 % and the rest formed 54%. In our study ultrasound had a sensitivity of 89% and specificity of 98% in the evaluation of pelvic lesions. **INTERPRETATION AND CONCLUSION:** Cases with pelvic masses can be resolved promptly by an excellent collaboration between the referring physician and the radiologist. As the diagnosis should be assessed in the shortest time with the greatest care and accuracy, it is necessary to choose the appropriate available examinations, thus reducing the time needed to establish a diagnosis and decreasing the number of examination required. Whenever the need arose we never hesitated to go for other modalities like CT, MRI scan and MCU.

KEYWORDS: Ultrasound, Pelvic masses, Transabdominal, Transrectal, Transvaginal, Patients, Diagnosis, Malignant, and Benign.

INTRODUCTION: Pelvic Masses have been a leading cause of morbidity and mortality in the general population. Pelvic Masses get identified only after they become significantly large. Earlier digital bimanual examination was the only available method to identify pelvic masses. X-ray examination gave subtle diagnostic information. Invasive radiological contrast examination like gynaecography or angiography are considered superfluous in this era.

The advent and use of diagnostic ultrasound changed the spectrum of diagnostic approach to pelvic masses. Pelvic ultrasound today forms the primary examination mode in the evaluation of pelvic masses. It provides the physician/ gynecologist the necessary information to plan out the right therapeutic approach required in the given situation. Hence ultrasound has become a much asked for examination in the approach to the management of pelvic masses.

Starting from 1990, ultrasound has become the most indispensable diagnostic technique in the appropriate evaluation and management of all pelvic masses in female and male patients.

Transabdominal, transvaginal and transrectal ultrasound examinations have evolved to provide the complete road map towards the diagnosis and management of pelvic masses. Ultrasound examination identifies the abnormalities much before the disease has become rampant and thus helps in decreasing the morbidity of patients with pelvic masses.

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OBJECTIVES OF THE STUDY: The main objective is to quantify the diagnostic yield of USG in helping to narrow down the differential diagnosis in patients suspected to be suffering from pelvic masses and guide in the appropriate management. By narrowing the differential diagnosis and many a times accurately diagnosing the pelvic masses, USG curtails negative laparotomies. It also provides information about the progress of the condition and acts as an adjuvant to all other available diagnostic procedures.

IMPORTANT ULTRASONOGRAPHIC FEATURES:

Appendicular abscess/ Ac Appendicitis:

- Fluid collection (hypoechoic) in the appendicular region which may be well circumscribed and rounded or ill-defined and irregular in appearance
- Appendix may be visualised within the mass
- Blind ending tubular structure which is non-compressible, aperistaltic and having a diameter of 6 mm or greater
- Appendicolith causing acoustic shadowing.
- High echogenicity surrounding fat.
- Surrounding fluid or abscess.
- Oedema of caecal pole.
- Maximum tenderness over appendix.

Benign Hypertrophy of Prostate:

- There will be increase in volume of the prostate with a calculated volume more than 30 cc the central gland is enlarged, and is hypoechoic or of mixed echogenicity.
- Calcification can be seen both within the hypertrophied gland as well as in the pseudocapsule.
- Post-micturition residual volume will be of significant quantum.
- Calculus impacted at the Internal Urethral meatus.
- A calculus of significant size can be seen impacted at the Internal Urethral meatus.
- Even if the patient is put on lateral decubitus position the calculus will not move away.
- This produces strangury, distension of bladder and dysuria.

Ca Cervix:

- It is seen as a hypoechoic mass involving the cervix.
- If there are enlarged lymph nodes they can be visualised by USG.

Ca Prostate:

- Transrectal ultrasonography (TRUS) is often initially performed in order to detect abnormalities and to guide biopsy, usually following an abnormal PSA level or DRE.
- Ultrasound is used to direct biopsy of suspicious, hypoechoic regions, usually in the peripheral zone. Because of the high incidence of multifocality, systemic sextant biopsies are recommended.
- On ultrasound prostate cancer is usually seen as a hypoechoic lesion in the peripheral zone of the gland, but can be hyperechoic or isoechoic also.

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- Transrectal ultrasound is also the modality of choice for directing brachytherapy seeds into the prostate gland.
- Dilated Seminal vesicle.
- Caliber of more than a cm is considered as dilated Seminal vesicle.
- It could be due to cyst, calculus or inflammatory stricture.

DUB:

- The Uterus will be significantly bulky with homogenous myometrial and endometrial echoes.
- Endometrial thickness will be increased.

Ectopic pregnancy Ruptured:

- Gestational sac in the adnexa with fetal pole, cardiac activity & yolk sac in unruptured.
- In ruptured, collection of blood depending on the site of Ectopic pregnancy.
- Endometrial decidual reaction without a sac.
- Adenexal mass – echopoor or hyperchoic
- Gestational sac in the adnexa with a thick rind without a fetal pole.
- Cul – de sac fluid.

Fibroid Uterus:

- Ultrasound is used to diagnose the presence and monitor the growth of fibroids.
- Uncomplicated leiomyomas are usually hypoechoic, but can be isoechoic, or even hyperechoic compared to normal myometrium.
- Calcification is seen as echogenic foci with shadowing.
- Cystic areas of necrosis or degeneration may be seen.

Haematometrocolpos:

- Irregularly tubular structure filled with menstrual bleed in the pelvic cavity in mid sagittal section
- The uterus and vagina are distended with fluid showing low level echoes with posterior enhancement. The uterine wall is thicker than the vaginal wall and the vagina appears more distended. Based on patient age and clinical history, and the classic findings of dilated fluid filled vagina and uterus, the diagnosis was hematometrocolpos due to imperforate hymen.

Hydrosalpinx:

- May be seen as a thin-or thick-walled, elongated or folded, tubular, C shaped or S shaped fluid-filled structure that is distinct from the uterus and ovary. A hydrosalpinx results from an accumulation of secretions when the tube is occluded at its distal end (obstruction of the ampullary segment) or both ends. On rare occasions, transient distention of the fallopian tubes occurs because of retrograde passage of blood from the uterus without complete distal occlusion.

Mesenteric adenitis:

- Multiple, enlarged hypoechoic lymph nodes.
- AP diameter > 4 mm, in RIF.
- With or without mildly thickened bowel wall.

Ovarian Cyst with Haemorrhage:

- Well defined ovarian cyst.
- Internal echoes within the cyst.
- Thickened wall.

Ovarian Mass:

- For characterization of ovarian masses, ultrasound is often the first-line of choice, especially for distinguishing cystic from complex cystic-solid and solid lesions. However CT & MRI will throw more light on arriving at a near possible diagnosis.

Para ureteric Diverticulum or Hutch Diverticulum:

- Invariably a congenital phenomenon, seen at vesicoureteric junction. Is associated with significant Vesico Ureteric reflux as the musculature is dysplastic and hence the valve mechanism at the Vesico ureteric junction is distorted.
- Round or oval anechoic fluid collections arising from base of urinary bladder or around ureteric orifice.

PID:

- Changes of turbid fluid in the cul-de-sac,
- Salpingitis, Oophoritis, Endometritis come under this category
- Ultrasonography should be the first diagnostic imaging examination to be performed in cases of suspected PID in which there are ambiguous or unexplained clinical findings or an inability to perform an adequate clinical examination.
- Ultrasonography is also indicated to evaluate for complications of PID, which may impact operative versus non operative management or the decision to hospitalize a patient.
- Most often, ultrasonography is the triaging tool in a female child or adolescent with right lower quadrant or pelvic pain, particularly because of concerns about radiation exposure. Transvaginal sonography allows detailed visualization of the uterus and adnexa, including the ovaries and thickened fallopian tubes.
- Transabdominal sonography is complementary to the endovaginal examination because it provides a more global view of the pelvic contents.

Pelvic (Ectopic) Kidney with Hydronephrosis:

- Patient with an ascended ectopic kidney in the pelvic cavity presented with mass in the pelvic cavity and dysuria.
- USG could without any ambiguity come to a conclusion of Ectopic kidney with Hydronephrosis and Rotation anomaly. The renal pelvis was anteriorly seen. The cause of Hydronephrosis could not be differentiated between congenital PUJ obstruction and Obstruction due to kink at the PUJ

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region due to Rotation anomaly. When the patient was put on knee elbow position the degree of Hydronephrosis got reduced marginally. Hence the possibility of Hydronephrosis due to Obstruction due to kink at the PUJ region was concluded. RGP confirmed the USG diagnosis.

Prostatic Abscess:

- When transabdominal scan shows changes suggestive of Prostatic lesion Transrectal sonography (TRUS) is considered.
- TRUS is very reliable imaging method to diagnose a prostatic abscess. It usually demonstrates ill-defined hypoechoic areas within an enlarged and/ or distorted prostate gland. There may be inhomogenous echoes within it.

Pelvic Lymphangioma:

- USG will reveal septated fluid filled mass with debris in the pelvic cavity compressing the bladder depending upon the size and situation. There will be no solid elements or vascularity within the lesion.
- CT of pelvis will confirm the above.
- USG guided aspiration and analysis will confirm the diagnosis.

MATERIALS AND METHODS: The present study consisted of 50 patients referred from various clinical departments of Raja Muthiah Medical college Hospital to the Department of Radiology.

There were patients of both sexes. The age group comprised of Newborn to Octogenarians. The youngest patient was 6 years and the oldest patient was 76 years.

All patients who presented with a pelvic mass were admitted in their respective departments and brief relevant history was taken and a quick examination was performed as per the proforma given below.

A provisional diagnosis was made as per the history and examination findings. After the routine blood and urine investigations patients were brought to the radiology department and subjected to a plain radiogram of the abdomen to be followed by an ultrasound examination. Some of them were also subjected to other radiographic examinations as per the requirement.

Proper technique of scanning is very important in obtaining the diagnosis. Transvaginal and transrectal scans were performed when there indication.

When need arose patients were subjected to contrast study in conventional radiology. In a few instance CT and MRI were performed to confirm the diagnosis or to rule out other possibilities.

Whenever the patients were subjected to surgery, operative findings and histopathological report were recorded and a final diagnosis was made.

Patients who were managed medically were followed up clinically and repeat ultrasound scans were performed and the diagnosis was confirmed.

RESULTS: Ultrasound scan was performed in 50 patients who presented with history, symptoms and signs of pelvic mass. The results are enumerated below.

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Age Group (years)	No. of Cases	% of Cases
Newborn - 10	1	2 %
10 - 20	8	16 %
21 - 30	15	30 %
31 - 40	9	18 %
41 - 50	5	10 %
51 - 60	7	14 %
61 - 70	1	2 %
71 - 80	4	8 %
Total	50	100 %

TABLE 1: Showing age wise incidence

CHART- 1: Showing the age wise frequencies of pelvic masses Age wise incidence.

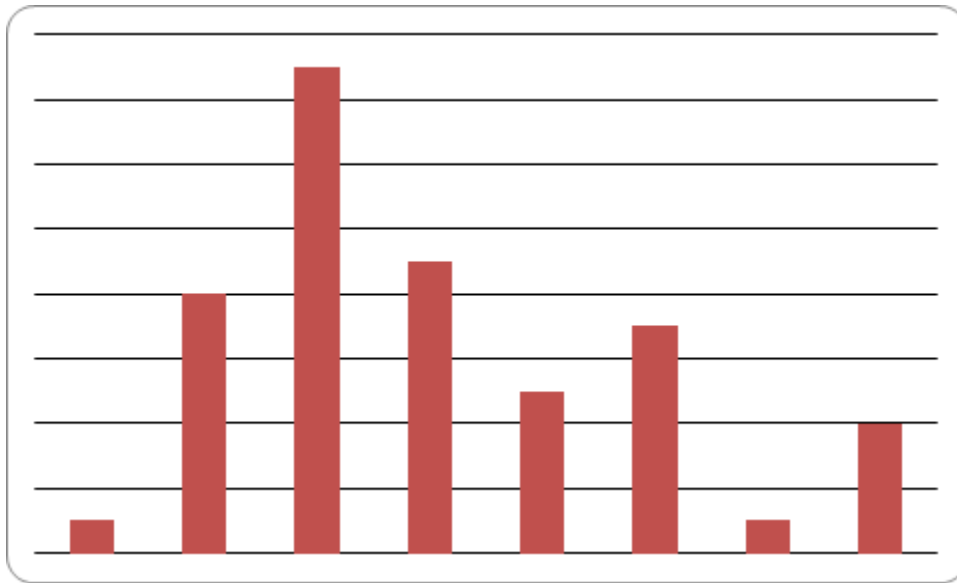


Chart 1

Sex	No. of cases	% of Cases
Males	21	42 %
Females	29	58 %
Total	50	100%

TABLE II: Sex wise distribution of disease

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CHART- II: This chart shows that more females came out with pelvic problems.

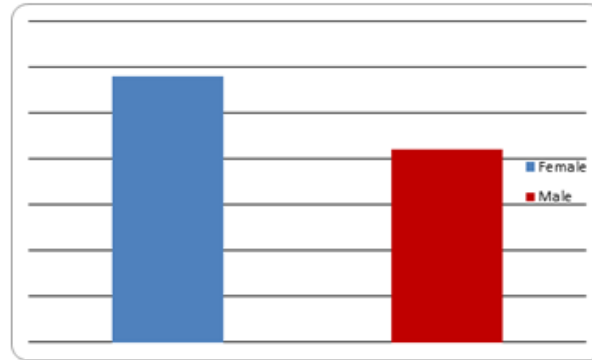


Chart II

Socio-economic status	No. of Cases	% of Cases
Lower	39	78 %
Middle	8	16 %
Higher	3	6 %
Total	50	100%

TABLE III: Showing the socio-economic status of patients

CHART- III: This chart shows that patients with lower socio-economic status are more than percentage of patients with higher socio-economic status.

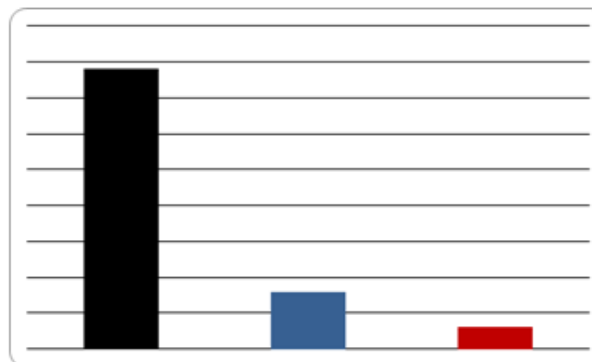


Chart III

Symptoms	No. of Cases	% of Cases
Heaviness in lower abdomen	6	12 %
Lower abdomen pain	18	36 %
Menstrual irregularity with pain	9	18 %
Dysuria	4	8 %
Infertility	1	2 %
Leucorrhea	2	4 %
Poor stream of Urination	7	14 %

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Pain and bleeding PV	2	4 %
Bleeding PV after Menopause	1	2 %
Total	50	100%

TABLE IV: Showing percentage of patients with different chief presenting complaints

Chart- IV:

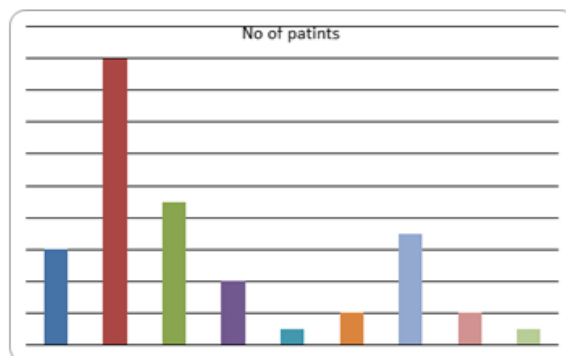


Chart IV

Types of cases	No. of Cases	% of Cases
Ca Cervix	1	2 %
Ca Ovary	2	4 %
Ovarian cyst	5	10 %
DUB	2	4 %
Haematometrocolpos	1	2 %
PID	4	8 %
Ectopic Pregnancy-ruptured	2	4 %
Fibroid Uterus	4	8 %
Hydrosalpinx	1	2 %
Endometriosis	1	2 %
Appendicular abscess	8	16 %
Calculus impacted at Internal Urethral meatus	1	2 %
Dilated Seminal vesicle	1	2 %
Para ureteric Diverticulum	1	2 %
Prostate Abscess	3	6 %
BHP	5	10 %
Ca Prostate	2	4 %
Pelvic Kidney with Hydronephrosis	1	2 %
Mesenteric adenitis	4	8 %
Pelvic Lymphangioma	1	2 %
Total	50	100%

TABLE V: Spectrum of ailments

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Types of cases	No. of Cases	% of cases
Emergency	12	24 %
Non-Emergency	38	76 %
Total	50	100%

TABLE VI: Cases presented as emergency

Chart- VI: This chart shows that the patients presented as emergency are less than non- emergency patients.

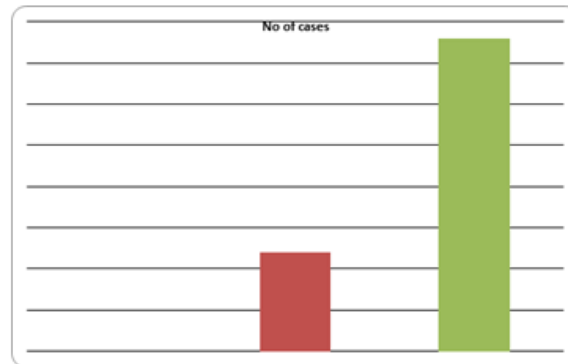


Chart VI

Types of Cases	No. of cases	%of cases
Gynecological and Obstetric cases	23	46 %
General	27	54 %
Total	50	100 %

TABLE VII: Gynecological and Obstetric related cases

Chart - VII

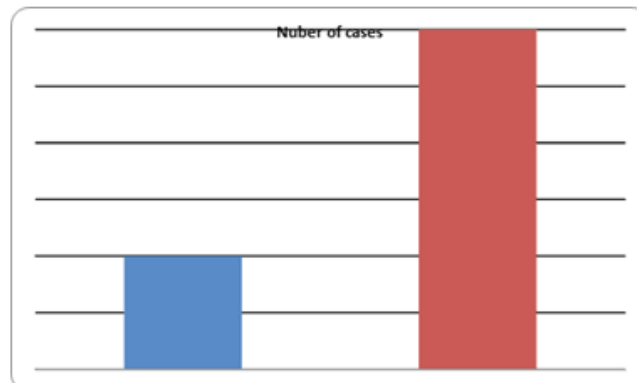


Chart VII

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Types of Cases	No. of cases	% of cases (out of 24 pts.)
Malignant	5	10 %
Benign	45	90 %
Total	50	100%

TABLE VIII: Nature of Ovarian pathology after histopathological examination

Chart - VIII

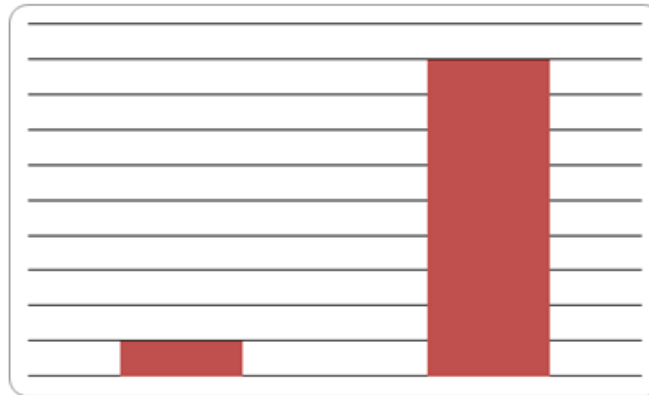


Chart VIII

Types of cases	No. of cases	% of cases
Positive	43	86 %
Error in conclusion	1	2 %
Equivocal *	6	12 %
Total	50	100%

TABLE IX: Diagnosis by USG

Equivocal *: We had to do further investigations to come to a Final diagnosis – CT, MRI & MCU

Chart - IX

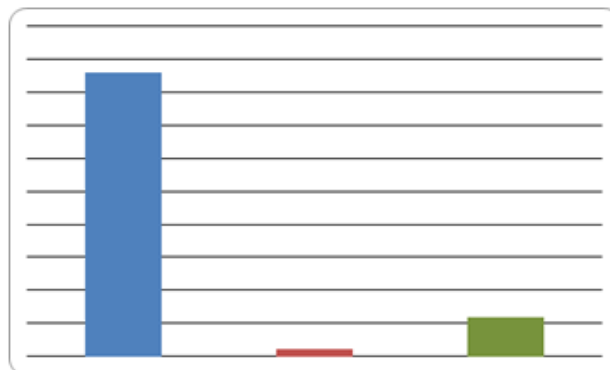


Chart IX

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DISCUSSION: 50 patients who presented with pelvic masses were part of this study spread over a period of two and a half years. Definitive diagnosis could not be arrived in? Patients. Hence need for higher modalities were necessary.

Ultrasound diagnosis in the patients were confirmed either by post-operative findings or in case of medically managed cases, with higher modalities like CT, MRI, MCU by FNAC, clinical follow up and follow-up ultrasound scans.

In our study of patients were in the group of Newborn till Octogenarian. Obstetric and gynecological related cases formed 46% of all the pelvic masses and rest consisting of 54 %.

In our study ultrasound had a sensitivity of 89 % and specificity of 98 % in the evaluation of pelvic masses.

Out of 50 positive cases error was committed in one. Enlarged Lymph node was interpreted as pyogenic origin. After CT with oral and IV contrast it was concluded as TB abdomen.

In six patients we had to resort to other modalities like CT, MRI, MCU and FNAC to arrive at a definitive diagnosis.

CONCLUSION: Cases with pelvic masses can be resolved promptly by an excellent collaboration between the referring physician and the radiologist. As the diagnosis should be assessed in the shortest time with the greatest care and accuracy, it is necessary to choose the appropriate available examinations, thus reducing the time needed to establish a diagnosis and decreasing the number of examinations required.

Plain radiography is not confirmatory imaging modality. It is capable of giving an overview of the entire abdomen and pelvis and gives appropriate indications on the systems that could be involved in the problem. It demonstrates abnormal locations of gas, abnormal viscera, classifications and foreign materials, skeletal and lower lung pathology. However it is less specific in quite a large number of patients with pelvic masses.

Nevertheless plain radiographic findings aid in the decision to proceed to other modalities and give an indications as to where to look for when performing ultrasound scanning. The possible area or organ of involvement can be adequately judged by just a plain radiogram. It gives us a road map for performing an ultrasound scan of abdomen and pelvis as also excludes skeletal causes. Thus more attention can be paid to the organ of involvement and thus the pathology can be well picked up within the shortest possible time. Ultrasound combined with CT, MRI and MCU definitely yields more diagnostic information in all cases with pelvic masses and thus avoids negative laparotomies.

Hence ultrasonography is recommended to be a very useful modality with regards to diagnostic yield. It makes possible to establish the diagnosis quickly and thus start appropriate treatment early. This greatly reduces the morbidity, mortality and the period spent by the patient in the hospital. It is also useful in serious cases and in some conditions which threaten the patient's life, as it is available on the bedside of the patient and also could be used in the operation theatre, thus improving the outcome of surgery.

Ultrasonography has become an integral part in the diagnosis and follow up of patients with pelvic mass. In conclusion sonography with a good equipment when appropriately performed by an experienced radiologist, using a proper methodology and standard guidelines has proved to be a very useful highly diagnostic and a reliable method with good sensitivity and specificity.

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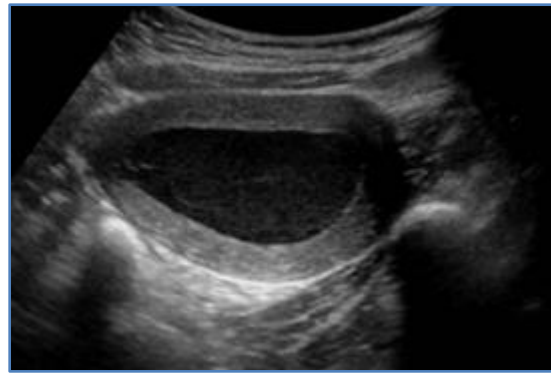
It thus has become an indispensable tool for the diagnosis, management and follows up of all cases with pelvic mass.

SUMMARY: Fifty cases of the pelvic masses were studied and following results were obtained:

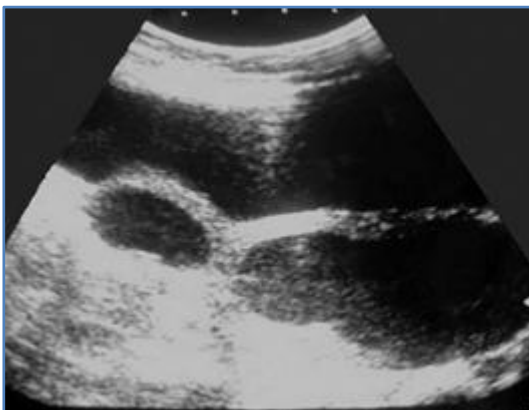
1. Maximum number of patients were in the age group of 21 – 40 years (48%) and minimum number of patients were in the age group of New born to 10 years(2%) and 61- 70 yrs (2%)
2. Females were affected more in number. 29 patients (58%) were females and 21 patients (42%) were males.
3. Out of 50 patients, diagnosis was erred in 1, and had to go in for other modalities like CT, MRI and MCU to arrive at a definitive diagnosis.



RUPTURED ECTOPIC PREGNANCY



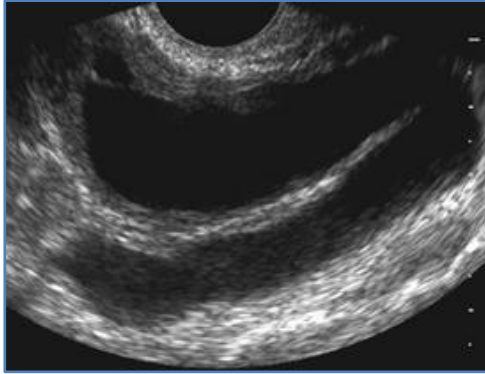
HAEMATOMETROCOLPOS- in CS



HEMATOMETROCOLPOS - in LS



DILATED SEMINAL VESICLE

**Hydrosalpinx****Ectopic (Pelvic Kidney) with Rotation anomaly and mild Hydronephrosis****URETEROCELE****ENLARGED PROSTATE****BIBLIOGRAPHY:**

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Date of Submission: 22/08/2014.
Date of Peer Review: 23/08/2014.
Date of Acceptance: 09/10/2014.
Date of Publishing: 10/10/2014.