



ULTRASOUND EVALUATION OF ACUTE PELVIC PAIN IN FEMALES OF REPRODUCTIVE AGE GROUP

Radiodiagnosis

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ABSTRACT

Introduction: Acute pelvic pain is a common presenting complaint in women necessitating emergent medical evaluation. Given the many possible causes of pelvic pain and overlap of symptoms, a structured approach to image interpretation along with thorough clinical and menstrual history and simple tests like pregnancy test helps to narrow down the differentials. Ultrasound of abdomen and pelvis is the first line imaging modality routinely used followed by CT if indicated. Hence the radiologist should be able to recognise the ultrasound findings of various causes of pelvic pain. **Purpose:** To discuss the normal physiological and pathological processes that may cause acute pelvic pain in women, to analyse the ultrasound findings of various causes of acute pelvic pain in women and to highlight the importance of ultrasound as initial modality of choice in evaluation of acute pelvic pain in females. **Material and Methods:** In our study 200 female subjects of reproductive age group (15-45 years) who came to the radiology department with acute pelvic pain were included. All these patients were initially subjected to ultrasound examination. Ultrasound abdomen and pelvis was done in all cases and transvaginal ultrasound was done wherever needed. This study was conducted in the department of radiodiagnosis, government general hospital, kakinada over a period of 2 years (from November 2018 to November 2020). The ultrasound equipment used in this study is ESAOTE-MYLABSEVEN. **Results:** Multiple entities, including normal physiologic changes, may cause acute pelvic pain in females of reproductive age group. In our study among all the causes, Pelvic inflammatory disease and ovarian cysts are most commonly diagnosed gynaecological conditions. Ectopic pregnancy is the most commonly diagnosed obstetric condition. Appendicitis is the most commonly diagnosed non gynaecological condition. Among all the causes hemorrhagic ovarian cyst had varied imaging appearances on ultrasound. Ultrasound played a crucial role in identifying the patients who needed immediate surgical intervention. **Conclusion:** This study highlighted the role of ultrasound in diagnosing the cause of pelvic pain in female patients who presented to our department and thereby aiding the clinician in appropriate planning and management of these cases

KEYWORDS

Acute Pelvic Pain, Acute Appendicitis, Pelvic Inflammatory Disease, Ectopic Pregnancy, Hemorrhagic Ovarian Cyst.

INTRODUCTION:

Pelvic pain is abdominal pain located below the level of the umbilicus. Acute pelvic pain generally implies pain that is of less than 3-month duration. When a female in the reproductive age presents with acute pelvic and/or lower abdominal pain, the first diagnoses to be considered are those that are life-threatening and would require urgent and/or emergent surgical intervention. The differential diagnosis of acute pelvic pain in the female of reproductive age includes many different organ systems (i.e. gastrointestinal, gynaecological, obstetric, urological, vascular, etc.). To narrow the differentials and to make a diagnosis a cost-effective and efficient strategy needs to be employed. Ultrasound is the initial imaging modality of choice for evaluation of acute pelvic pain as it is readily available, non-invasive, non-ionizing radiation is used and relatively low price compared with other cross-sectional imaging techniques like computed tomography and magnetic resonance imaging. TVS which has higher resolution should be used whenever possible, although TAS is recommended when uterine and adnexal structures are beyond the field of view of the transvaginal probe. Duplex and color or power Doppler sonography are essential adjuncts to gray-scale imaging which can be used to characterize vascularity of the ovaries, adnexal structures and uterus, and provides information that may be helpful in narrowing the differentials

AIM:

To study the role of ultrasound in identifying the different causes of acute pelvic pain in females who presented to the radiology department and its efficacy in segregating the patients who need immediate surgical intervention and those who can be managed conservatively.

Material and Methods:

The study was conducted after obtaining approval from the Institutional research and Ethics Committee. 200 Patients presenting with acute pelvic pain to the our department were included in the study. Ultrasound abdomen and pelvis was done for all these patients. Transvaginal ultrasound (TVS) was done wherever needed. Verbal consent was taken before performing TVS. Imaging findings were described in this study. Demographic data of patient such as age were noted, beta HCG values were obtained in cases of amenorrhea. Routine blood investigations were obtained wherever needed. The above obtained data was systematically tabulated and analyzed

RESULTS:

Our study included a study population of 200 female subjects who presented with acute pelvic pain to our department. In the present study, the maximum no. of cases were in the age group of 20 to 32 years (36%). The mean age is 29 years. Most commonly associated symptom of acute pelvic pain was nausea and vomiting in 40% of cases followed by fever in 28% cases. Other symptoms were dysuria, vaginal discharge and bleeding, haematuria and distention. Tenderness was the most common sign of acute pelvic pain seen in 60% of cases followed by palpable pelvic mass and guarding.

The most common cause of pelvic pain is adnexal masses. The most common cause of non gynecological condition is appendicitis presenting as pelvic pain. ovarian cysts were most common in adnexal pathologies constituting acute pelvic pain. These constituted 54 cases, i.e. 38.5% of Adnexal lesions in acute pelvic pain. PID constitutes 46 cases, i.e. 32.8% of cases. The least common adnexal pathology causing acute pelvic pain was ovarian torsion making up only 4 (2.8%) cases. Out of 140 cases of adnexal pathologies, there were 58 ovarian masses and 76 fallopian tube pathologies. The 32 of ovarian masses were on right side and 26 were on left side; 30 of them showed size between 3-5 cm and 28 were having size >5cm. The cystic appearance with posterior acoustic enhancement was seen in 26 cases and heterogeneous appearance in 28 cases. The fluid debris levels were seen in 5 cases of ovarian masses. Enlarged ovaries with multiple follicles were seen in 4 cases. The thickened walls of fallopian tubes were seen in 12 cases of fallopian tube pathologies with dilated tubes in 11 cases, incomplete septa in 8 cases and 4 cases were having tubo-ovarian complexes.

There were a total 38 cases of acute appendicitis. Out of these, the inflamed appendix was visualised as a noncompressible, aperistaltic tubular structure blind ended with an average diameter of more than 6 mm in 33 cases. Appendicular mass formation presented as heterogeneous mass in right iliac fossa in 5 cases

A total of 10 patients presented with urinary system pathologies. Dilated pelvicalyceal system and dilated ureter were seen in 10 patients. Ureteric calculus was seen in 2 patients; 6 patients showed associated renal calculi

There were total 30 cases of ectopic pregnancy. Most of these cases were on right side . All these patients had history of amenorrhoea and elevated beta HCG levels . These patients presented with pain abdomen and bleeding per vagina. 12 patients had free fluid with fine internal echoes suggestive of hemoperitoneum. These cases were managed surgically and the rest were managed conservatively. for one case which was diagnosed as live right tubal ectopic pregnancy , 2 ml of KCL was injected into fetal heart under ultrasound guidance and after 2 mins there was absent of fetal heart suggestive of fetal demise.

6 % of patients had no specific findings on ultrasound imaging .The cause of pelvic pain in these patients may include physiological causes like pain during ovulation, (mittelschmerz), menstrual cramps and other causes like urinary tract infections . In such cases proper menstrual and clinical history obviates the need for further imaging

Table 1. Incidence Of Pathologies Based On Ultrasound Findings

INCIDENCE	No of cases	percentage
ovarian cyst	54	27%
Pelvic inflammatory disease	46	23%
Appendicitis	38	19%
Ectopic pregnancy	30	15%
No specific imaging findings	12	6%
Urological causes	10	5%
Uterine fibroid	06	3%
Ovarian torsion	04	2%

Table 2. Age Wise Distribution Of Different Pathologies

PATHOLOGY	RANGE OF AGE WISE DISTRIBUTION
ovarian cysts	20-37 years
Pelvic inflammatory disease	22-40 years
Ectopic pregnancy	19-28 years
Appendicitis	24-30 years
Ovarian Torsion	15- 25 years
Ureteric calculi	32-44 years
Fibroid	28-38 years

Table 3. Ultrasound Findings Of Free Fluid With Internal Echoes Indicating Hemoperitoneum

SEVERITY	NO OF CASES	PERCENTAGE
MILD (< 250 ml)	14	70%
MODERATE (250 -1000 ml)	04	20%
SEVERE (1000 ml)	02	10%
Total = 20 cases		

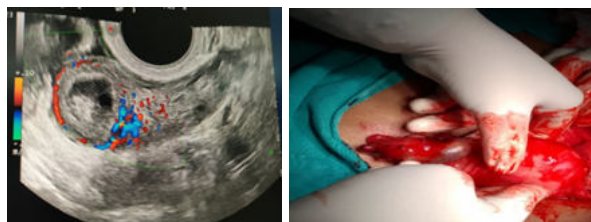
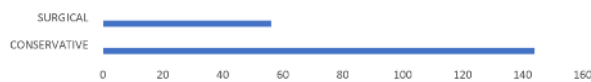
Table 4. Gynecological And Non Gynecological Conditions

	NO OF CASES	PERCENTAGE OF CASES
GYNECOLOGICAL	140	70 %
NON GYNECOLOGICAL	60	30%

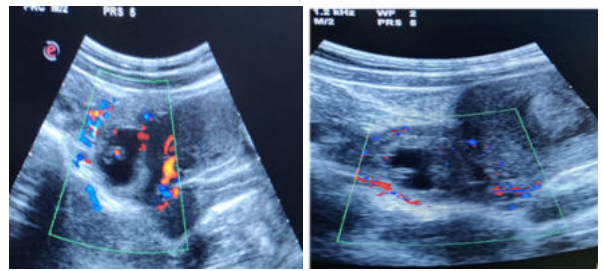
Table 5. Management Of Cases Based On The Ultrasound Findings

TYPE OF MANAGEMENT	NUMBER OF CASES
CONSERVATIVE	144
SURGICAL INTERVENTION	56

TYPE OF MANAGEMENT BASED ON THE ULTRASOUND FINDINGS



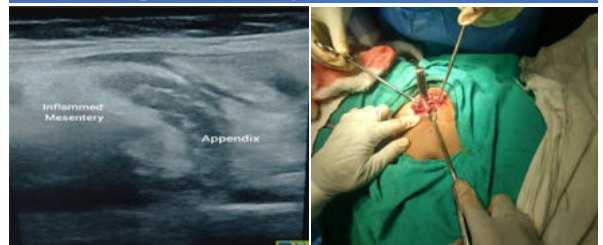
TVS image in a 22 year old female with history of amenorrhoea and positive beta HCG shows echogenic mass lesion in right adnexa . on colour doppler it shows ring of fire appearance (left) . Intraoperative image on the right



Transabdominal image in a 19 year old female patient shows a gestational sac with live fetus in right adnexa s/o tubal ectopic pregnancy (left) . 2ml of kcl was injected into the fetal heart under usg guidance . After 2 mins fetal heart was absent s/o fetal demise (right)



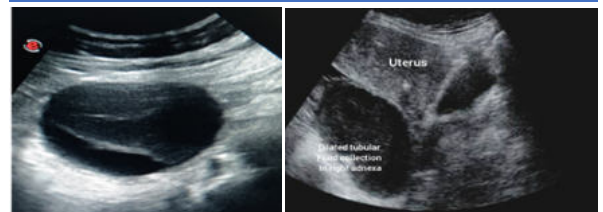
Transabdominal image in 23 year old shows a gestational sac with fetus and a anechoic lesion with internal septations in right adnexa s/o hemorrhagic ovarian cyst



ULTRASOUND IMAGE SHOWS INFLAMMED & DILATED APPENDIX WITH ADJACENT MESENTERIC INFLAMMATION S/O ACUTE APPENDICITIS ON THE RIGHT AND INTRAOPERATIVE IMAGE ON LEFT



ULTRASOUND PELVIS IN A 15 YEAR OLD FEMALE REVEALED AN ENLARGED RIGHT OVARY WITH STROMAL EDEMA . COLOUR DOPPLER REVEALED ABSENT VASCULARITY . FINDINGS ARE S/O RIGHT OVARIAN TORSION



Transabdominal ultrasound shows anechoic lesion with internal echogenicity s/o retracting clot in a hemorrhagic ovarian cyst

Dilated tubular septate collection with internal echoes noted in right adnexa s/o pyosalpinx

DISCUSSION:

The current study evaluated 200 patients between the age group of 15 to 45 years of age. The maximum number of cases were seen between age group of 20-32 years accounting up to 36% of the total cases. The mean age of cases being 29 years. This correlated well with previous

study done by SefaKurt et al, showing the mean age of 29.9±6.01 years. In present study, the most common associated symptom with acute pelvic pain is nausea and vomiting and is seen in about 40% of cases. The next common symptom is fever, vaginal bleeding ,distension . In clinical signs, tenderness is the most common sign of acute pelvic pain. It is seen in 60% of cases. The rebound tenderness, palpable mass in pelvis,guarding are also seen. Nadah Zafar et al, in their study fever, flank pain, dysuria, haematuria, vaginal bleeding and vaginal discharge. Rochelle F.Andreotti et al shown that the clinical diagnosis of acute pelvic pain in the female patient can be challenging because of nonspecific signs and symptoms, and imaging has been found to be valuable in narrowing the differential diagnosis.In our study adnexal lesions is most commonly involved in acute pelvic pain and is seen in 70 % cases.

Appendicitis is also the most common diagnosis among non gynaecological disorders that cause acute pelvic pain.The second most common non-gynaecological APP factor was nephrolithiasis. The most common gynaecological cause for APP was ovarian cysts. In another study pelvic inflammatory disease is one of the most common causes of acute pelvic pain in women. In our study there were total 38 confirmed cases of acute appendicitis, out of which 32 were correctly diagnosed with ultrasound with a sensitivity of 84%. It correlates with the study of Bernard A. Birnbaum who reported sensitivities of 75%–90%, specificities of 86%–100% for the diagnosis of acute appendicitis. Out of these, the inflamed appendix was visualised as a non-compressible, aperistaltic tubular structure blind ended with an average diameter of more than 6 mm in 32 cases, i.e. 84.2%. It correlates well with the study of Jerry L. Old showing that the most useful finding on ultrasonography that is suggestive of appendicitis is an outer appendiceal diameter of 6 mm or greater on cross section.

In our study, total 140 cases of adnexal pathologies constitute acute pelvic pain cases. Ovarian cysts are most common in adnexal pathologies constituting acute pelvic pain. These constitute 54 cases i.e. 38.5% of Adnexal lesions in acute pelvic pain. It correlated well with the study of Kaisuke Ishihara et al, which showed that Haemorrhagic Ovarian Cyst (HOC) is often involved in acute abdomen. PID constitute 46 cases, i.e. 32.8 %of cases. This correlated well with a previous study, in which salpingitis and haemorrhagic ovarian cysts are most commonly diagnosed gynaecologic conditions presenting as an acute abdomen.Least common Adnexal pathology constituting acute pelvic pain in this study is ovarian torsion making up only 2.8% of cases (4 cases). It also correlated well with the study of Sandra O. Allison et al that Gynaecologic disorders in the woman with a negative pregnancy test who presents with acute pelvic pain include acute Pelvic Inflammatory Disease(PID), functional ovarian cysts, ovarian endometriomas and adnexal torsion.In our study, there were 58 ovarian pathologies and 76 fallopian tube pathologies in Adnexal lesions. The 32 (55.1%)of ovarian masses were on right side and 26 (44.8 %) were on left side. Leena Mawaldi et al stated that the right ovary is more likely than the left to undergo torsion of ovarian masses. (85.7%) showed size to be between 3 to 5 cm and 3 (14.3%) were having size more than 5 cm. Kiran A. Jain stated that the average diameter of the haemorrhagic ovarian cyst is 3.0 to 3.5 cm.Debra Houry et al stated that the mean size of the torsed ovary at surgery was 9.5 cm (Range 1 to 30 cm);77 (89%) patients had an ovary greater than 5 cm. Cystic appearance with posterior acoustic enhancement were seen in 26 (44.8%) of ovarian masses and 28 (48.2%) were having heterogeneous appearance.This also goes in accordance with Kiran A. Jain study stating that posterior enhanced through transmission is seen signifying the basic cystic nature of the haemorrhagic ovarian cyst. Oksana H. Baltarowich stated that most haemorrhagic ovarian cysts appear as masses with heterogeneous echogenicity with the largest subgroup being predominantly anechoic masses containing hypoechoic material.. Maitray D. Patel et al stated that short interval follow-up sonography of haemorrhagic ovarian cyst cases will nearly always show resolution of the mass. Fluid debris levels were seen in 5 (8.6%) cases of ovarian masses.Kiran A. Jain stated that a Haemorrhagic ovarian cyst can have a fluid-fluid or fluid-debris level. Enlarged ovaries with multiple follicles are seen in 4 cases of ovarian masses. M. Graif et al stated in their study that sonographic features of diffuse swelling of the ovarian parenchyma and follicular enlargement in the cortical zone were highly suggestive for torsion of the ovary. Thick walls of fallopian tubes were seen in 12 cases (80%) of fallopian tube pathologies. I. E. Timor-Tritsch et al in their study stated that 100% cases of acute tubal inflammatory disease have thick walls of fallopian tubes. Dilated tubes were seen in 11 cases (73.35%) of

fallopian tube pathologies. This also correlated well with the study of Jose Bajo Arenas et al, which states that dilated fluid filled tube is the most frequent result of pelvic inflammatory disease. Incomplete septa were seen in 8 cases (53.3%) of the fallopian tube pathologies. This correlated with the I. E.Timor-Tritsch et al study, which states that incomplete septa are seen in 86% of acute pelvic infection. This also correlated with the study of Jose Bajo Arenas et al, which states that 35.25% of cases of acute pelvic inflammatory disease have incomplete septa. In our study, 4 cases(26.7%) were having tubo-ovarian complexes. This also correlated with the study of Jose Bajo Arenas et al, which states that 23.4% of acute pelvic inflammatory disease patients have tubo-ovarian complexes. Free fluid in POD was seen in 45 cases (32.1%)of all the adnexal pathologies.This correlates well with the I. E. Timor-Tritsch et al study,which states that cul-de-sac fluid is more commonly seen in the acute cases. Seven out of the 14 (50%) showed some fluid in the cul-de-sac in their study.In our study, total 10 patients presented with acute pelvic pain with pathologies related to urinary system.Dilated pelvicalyceal system and dilated ureter were seen in 10 patients (100%)of ureteral calculus. Paul H. Ellenbogen et al in their study stated that hydronephrosis is correctly diagnosed by ultrasound in obstructed kidneys with sensitivity of 98%. Ureteric calculus was seen in 6 patients with a sensitivity of 75%. This correlated with the study of Seong Jin Park et al, showing the overall sensitivity ofsonography for detecting ureteral calculi were 98.3%. Six patients showed associated renal calculi. Thickened bladder wall and internal echoes were seen in 5 cases. It correlated well with the study of Richard D. Bellah et al, which stated that irregular bladder wall thickening is seen in acute cases ofurinary tract infections. We would like to point out few limitations of our study.

- 1) Overlap of findings on ultrasound
- 2) Body habitus

CONCLUSION:

In conclusion, ultrasound plays an important role in diagnosing and guiding appropriate management of acute pelvic pain in females . Knowledge of the common ultrasound appearances of various normal and abnormal gynecologic conditions allows their accurate diagnosis and expeditious management. Therefore the radiologist should be familiar with the ultrasound findings of various causes of pelvic pain .

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