



ROLE OF ULTRASONOGRAPHY IN EVALUATION OF ACUTE PELVIC PAIN IN FEMALES

Radio-Diagnosis

Ishween Kour* Junior Resident, Department of Radiodiagnosis, GMC Jammu. *Corresponding Author

Roopali Mangotra Junior Resident, Department of Radiodiagnosis, GMC Jammu.

Kashish Mahajan Junior Resident, Department of Radiodiagnosis, GMC Jammu

Kulbhushan Gupta Professor and Head, Department of Radio-diagnosis, GMC Jammu

ABSTRACT

Background: Pelvic pain in pregnant as well as non-pregnant females often represents a difficult challenge due to the variety of causes characterized by overlapping clinical symptoms, including gynaecological and non-gynaecological causes. Ultrasound (USG) is one of the best tools for the evaluating the female pelvis. It is very helpful in acute conditions to rule out different lower abdominal pathologies and is key to further management and appropriate treatment. **Objectives:** To assess the role of USG in acute pelvic pain & evaluate the common aetiologies of acute pelvic pain in females. **Material And Methods:** This prospective observational study was conducted in the Department of Radio-diagnosis and Imaging in a tertiary care hospital in Jammu over a period of 6 months (May 2022 to October 2022). Female patients presenting with acute pelvic pain were included in our study. USG examination was performed using Samsung Sonoace R7 machine. Data obtained was compiled and analysed using standard statistical analysis. **Results:** In our study, the age range of the patients was 21-60 years and most common age group was 21-30 years. On USG, commonest cause of Acute Pelvic pain was ovarian cysts (48%). Ectopic pregnancy was seen in 16% cases while pelvic inflammatory disease was seen in 10% cases. Uterine leiomyomas were the cause of acute pelvic pain in 8% of cases. Non-gynaecological causes included appendicular abscess, cystitis and ureteric calculus and were seen in 6% cases. In 12% cases, no diagnosis was made on USG. **Conclusions:** USG is a commonly used modality in evaluation of acute pelvic pain in females. It is very useful in emergency as it helps in quick evaluation and decision making for operative or medical treatment planning and can help in timely diagnosis without further imaging tests.

KEYWORDS

Acute Pelvic Pain, Ultrasound, Ovarian Cysts

INTRODUCTION

Pelvic pain is abdominal pain located below the level of the umbilicus. Pelvic pain that is of less than 3 months duration in a toxic, ill-appearing and unstable patient or chronic pain that is worsening is included in acute pelvic pain. When a female presents with acute pelvic, the first diagnosis to be considered are those that are life-threatening and would require urgent surgical intervention.

The role of pelvic ultrasound in the evaluation of acute pelvic pain has been well established. TVS should be used whenever possible, due to its higher resolution of anatomic detail, although transabdominal ultrasound is advocated when uterine and adnexal structures are beyond the field of view of the transvaginal probe.^[1]

Conditions which may be life-threatening and requiring surgical intervention (ectopic pregnancy, appendicitis, ruptured ovarian cyst, and ovarian torsion) and fertility-threatening conditions (pelvic inflammatory disease) should take precedence over other disorders. Sonography is especially important in the reproductive age group, particularly in pregnant patients due to its lack of ionizing radiation. Since sonography is non-invasive, radiation free, and cost effective, demonstrating high sensitivities across the most critical etiologies, it should be the initial imaging modality in the evaluation of acute pelvic pain in females.^[2]

MATERIALS AND METHODS

This prospective cross-sectional study was conducted over a period of 6 months (May 2022 to October 2022) in the Department of Radiodiagnosis in a tertiary care hospital in Jammu region. Female patients presenting to the emergency department with acute pelvic pain (<3 months duration) were included in our study. Females with pelvic pain of >3 months duration and females with intrauterine Gestational sac on USG examination were excluded from our study.

So a total of 50 female patients formed the material of the study.

The Procedure was explained to the patient and informed consent was taken. The patients were made to lie supine on the examination table. Patients were subjected to sonographic examination using Samsung Sonoace R7 ultrasound machines with a curvilinear probe of 3.5 MHz–5 MHz or linear high frequency probe 7-12 MHz or Trans Vaginal probe. Based on sonographic findings, provisional diagnosis was made. The final diagnosis was made on the basis of operative findings/therapeutic response/FNAC findings/ Histopathological/ Laboratory findings.

RESULTS

In our study, the commonest age group in females presenting with acute pelvic pain was 21-30 years followed by 31-40 years. The age range was between 21-60 years.

In present study, the most common symptoms associated with acute pelvic pain were nausea and vomiting followed by fever, dysuria, vaginal discharge, constipation, haematuria, distension.

The most common cause of acute pelvic pain in our study were the ovarian cysts (48%) including hemorrhagic cysts (20%) followed by simple cysts and complex cysts (8% each) and dermoid cysts (6%) and endometriomas (6%). Ectopic pregnancy was seen in 16% cases. Pelvic inflammatory disease was seen in 10% cases while uterine leiomyomas were the cause of acute pelvic pain in 8% of cases.

Non-gynecological causes like appendicular abscess, cystitis, and ureteric calculus were seen in 6% of cases. In 12% cases no diagnosis could be made on USG.

DISCUSSION

Acute pelvic pain in women is an extremely common presentation to emergency departments and is a significant cause of morbidity. USG is the modality of choice for the initial investigation and to rule out any life-threatening cause.

The current study evaluated 50 patients presenting with acute pelvic pain between the age group of 21-60 years. The maximum number of patients were seen within the age group of 21-30 years accounting for 50% of the cases.

In our study, specific cause was ascertained on USG in 88% of the cases and grouped into gynaecological (82%) and non-gynaecological causes (6%). No diagnosis on USG could be made in approximately 12% of the patients.

Gynaecological causes included ovarian cysts in which 20% were haemorrhagic cysts, followed by simple cysts and complex cysts (8% each), followed by dermoid cysts (6%) and endometriomas (6%). Ectopic pregnancy was seen in 16% cases while Pelvic inflammatory disease was seen in 10% cases. Uterine leiomyomas were the cause of acute pelvic pain in 8% of cases. Non-gynaecological causes included appendicular abscess, cystitis, and ureteric calculus seen in 6% of cases. These results are in concordance with a study done by Basnet P and Chhetri PK^[3] who obtained similar results in their study.

Simple Ovarian Cyst:

They are functional ovarian cysts which occur when a dominant graafian follicle does not ovulate or fails to involute. They are usually unilocular with thin walls and anechoic contents. They rarely exceed 8–10 cm in diameter and typically show resolution within 6 weeks. Posterior wall hyperechoic enhancement occurs because of reflection of the ultrasound beam from the posterior wall after travelling through the anechoic window formed by the clear cyst contents.^[4]

HAEMORRHAGIC OVARIAN CYST

Haemorrhagic ovarian cyst occurs due to occurrence of bleeding into a follicular/corpus luteal cyst. The appearance of a haemorrhagic cyst is variable and depends on the stage at which the patient is scanned. In the acute phase, it appears as widespread homogeneous echoes with a fluid level and a dependent echogenic component represented by the blood sediment and over time, with the progressive degradation of haemoglobin, a reticular structure with internal echoes is observed (fishing net, spider web, or lace-like structure). If there is rupture of the haemorrhagic cyst, peritonitis can occur.^[5]

ENDOMETRIOMA

Endometrioma is defined as the cyst that forms when ectopic endometrial glands and stroma in the ovary bleed. The cyst has an outer fibrous capsule and contains blood products with different ages. Characteristic US features include a unilocular cyst with internal homogeneous low-level echoes (ground glass haze), a perceptible wall and no solid component or internal vascularity at color Doppler US. Atypical endometriomas can also occur predominantly in older age group with imaging features including a fluid-fluid level and an avascular internal nodule or papillary projection.^[6] In addition, superficial endometriosis and adhesions can appear as ill definition and blurring of the ovarian margins. MRI is preferred imaging modality for endometriosis, however the use of transvaginal probes can achieve sensitivities & specificities more than 90% for deep endometriosis.^[7]

DERMOID CYST

Dermoid cysts also known as cystic mature teratomas, are a common benign ovarian pathology and generally contains fluid, fat and solid tissue and have typical sonographic features. Dermoid plug is the most common sonographic feature and appears as an echogenic mass within the cyst made up of hair, teeth or fat. Dermoid mesh includes multiple small hyperechoic lines and dots (dot and dash appearance) within the cyst forming a “mesh□like” picture because of small hairs floating in the cystic fluid. Tip of the iceberg sign; the appearance of a hyperechoic area, the base of which cannot be visualised due to a mass made up of matted hair and sebum casting an echogenic shadow. Fat□fluid level also known as a “hair□fluid level” or “fluid□fluid” level due to be the result of layering of serous fluid and sebum.^[8]

ECTOPIC PREGNANCY

It is defined as the absence of an intrauterine pregnancy with the presence of trophoblastic tissue located outside of the endometrial cavity. Tubal ectopic pregnancy is the most common and manifests as an extraovarian heterogeneous mass, usually representative of a hematoma at the site of ectopic implantation which can be also seen as an echogenic ring in the adnexa surrounding an unruptured ectopic pregnancy (tubal ring sign). Color Doppler often shows a ring of circumferential vascularity (ring of fire sign). Large volume of free intraperitoneal fluid greater than expected for a physiologic volume and complexity of the free fluid, with floating debris, blood products, and/or organized blood clots are suspicious features for ruptured ectopic pregnancy.^[9]

PELVIC INFLAMMATORY DISEASE

This entity consists of inflammation of the endometrium, fallopian tubes, pelvic peritoneum, and adjacent structures. The disease presents as tubo-ovarian complexes, peritonitis, and abscess formation. In the presence of a fluid-distended fallopian tube, common findings include a wall thickness greater than 5 mm, incomplete septa are seen as the tube folds back on itself and thickening of endo-salpingeal folds (cog wheel sign). Nonspecific findings of PID include fluid in the endometrial cavity or cul-de-sac and ovarian enlargement, often with numerous small cysts (“polycystic ovary” appearance”). With progression of disease, there is formation of a tubo-ovarian complex or an abscess.^[2] Inflammation with increased echogenicity of adjacent peritoneal fat may be seen.

UTERINE LEIOMYOMA

Uterine leiomyomas or uterine fibroids are the most common benign

gynaecological tumours and are broadly classified as submucosal, intramural and subserosal according to location. Leiomyomas usually appear as well-defined, solid, concentric, hypoechoic masses that cause a variable amount of acoustic shadowing. However, leiomyomas may present different echogenicity, usually hyperechoic or isoechogenic depending upon the level of calcification or/and the amount of fibrous tissue. Leiomyomas may have anechogenic components as a result of progressing necrosis.^[10] On colour doppler, predominantly peripheral vascularity is seen.

Other Causes

Appendicitis

Classically, appendicitis begins with nonspecific periumbilical pain which later localizes to the right lower quadrant. The pain arising from inflamed appendix may radiate to the right flank and right pelvic area.^[11] Ultrasound is the technique of choice for investigating suspected appendicitis, which include visualisation of a blind ending, dilated (>6–7 mm in diameter) aperistaltic and non-compressible, tubular structure arising from the caecum.

CONCLUSION

USG is widely used modality for diagnosis of acute pelvic pain. It is very useful in emergency setup as it helps in quick evaluation and decision making for operative or medical treatment planning. The recognition of such disorders can make timely diagnosis possible and avoid further imaging tests.

In our study, Acute pelvic pain was seen more commonly among females in reproductive age group and gynaecologic causes were the most common of which ovarian cysts were the commonest cause followed by ectopic pregnancy. Proper use of USG in the identification of the cause of acute pelvic pain can increase the cost-effectiveness of diagnostic imaging, while minimizing the radiation risk and optimizing patient care.

Table 1: Showing Distribution Of Causes Of Acute Pelvic Pain

Cause of acute pelvic pain	No. of patients	Percentage
Gynaecological causes		
1. Ovarian cysts	24	48%
2. Ectopic pregnancy	8	16%
3. Pelvic inflammatory disease	5	10%
4. Uterine leiomyomas	4	8%
Non-gynaecological causes	1	2%
1. Ureteric calculus		
2. Appendicular abscess	1	2%
3. Cystitis	1	2%
No cause found	6	12%
Total	50	100%

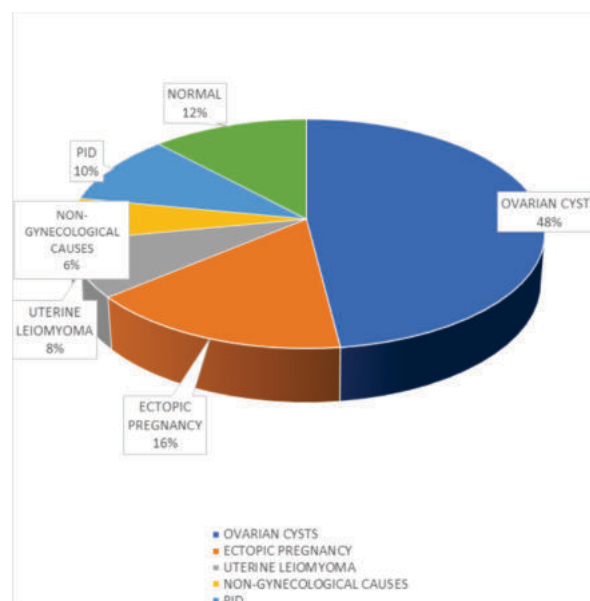


Figure 1: Pie Chart Showing The Distribution Of Causes In Females Presenting With Acute Pelvic Pain

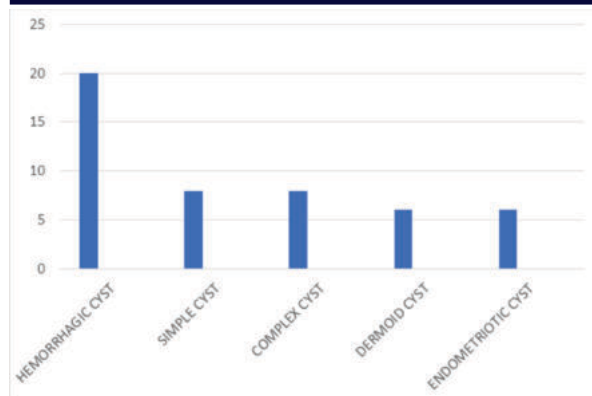


Figure 2: Bar Chart Showing The Distributions Of Ovarian Cysts In Females With Acute Pelvic Pain.

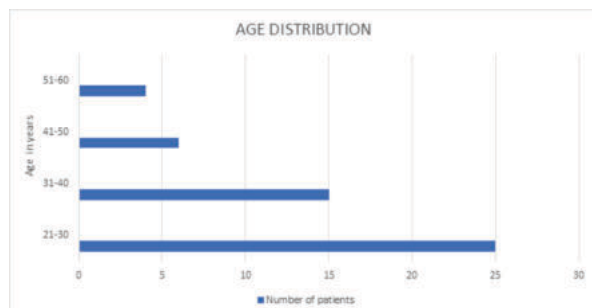


Figure 3: Bar Chart Showing Distribution Of Age In Females With Acute Pelvic Pain

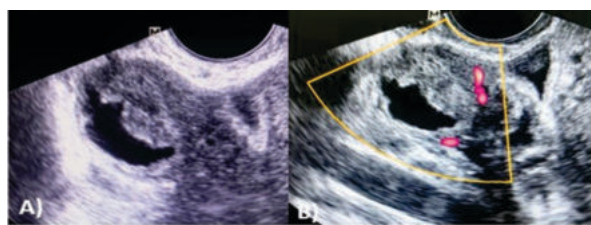


Figure 4: A) Transvaginal Ultrasound Showing Haemorrhagic Ovarian Cyst With Retracted Echogenic Clot (white Arrow). B) Doppler Examination Revealed So Significant Internal Vascularity.



Figure 5: Transvaginal Ultrasound Showing Endometriotic ovarian Cyst With Homogenous Ground Glass Internal Echoes.



Figure 6: Transabdominal Ultrasound Showing Complex Ovarian Cyst With Thick Internal Septa

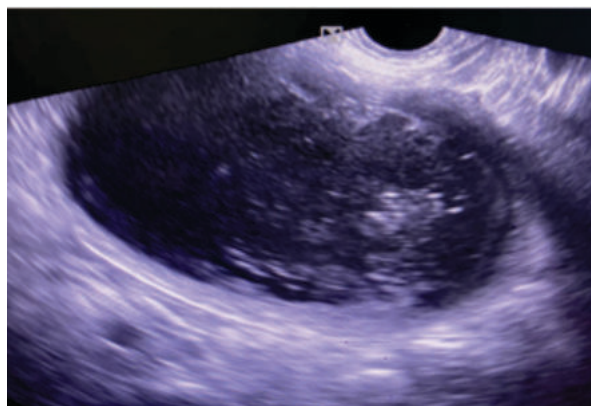


Figure 7: Transvaginal Ultrasound Showing Ovarian Dermoid Cyst With Dot And Dash Pattern.

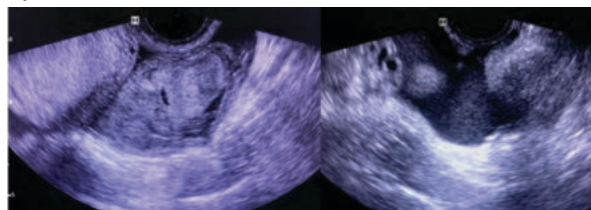


Figure 8: Transvaginal Ultrasound Showing Echogenic Adnexal Lesion In Left Adnexa With Free Fluid In Pelvis (ruptured Left Tubal Ectopic Pregnancy).

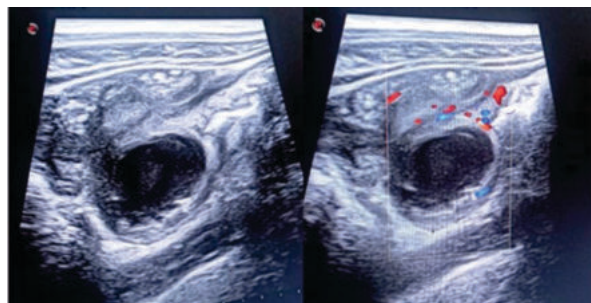


Figure 9: Ultrasound Images Showing Thick Walled, Hypoechoic Lesion In Close Proximity To Cecum With Increased Mesenteric Vascularity On Color Doppler.

REFERENCES

1. Gupta K, Gauba N, Singh A, et al. Sonographic Evaluation of Acute Pelvic Pain. J Evolution Med Dent Sci. 2016;5(46):2914-2921.
2. Andreotti RF, Harvey SM. Sonographic evaluation of acute pelvic pain. J Ultrasound Med. 2012 Nov;31(11):1713-8.
3. Basnet P, Chhetri PK. Ultrasound Evaluation of Acute Pelvic Pain in Non-Pregnant Reproductive Age Females. J Chitwan Med Col. 2021;11(36):51-53.
4. Sayasneh A, Ekechi C, Ferrara L et al. The characteristic ultrasound features of specific types of ovarian pathology (review). Int J Oncol. 2015 Feb;46(2):445-58.
5. Di Serafino M, Iacobellis F, Schillirò M.L, et al. Pelvic Pain in Reproductive Age: US Findings. Diagnostics (Basel). 2022 Apr 9;12(4):939.

6. Collins BG, Ankola A, Gola S, et al. Transvaginal US of Endometriosis: Looking Beyond the Endometrioma with a Dedicated Protocol. *Radiographics*. 2019; 39(5):1549-1567.
7. Gupta V, Aneet, Gupta S, et al. Ultrasound Evaluation of Gynaecological Causes of Right Iliac Fossa Pain. *Int J Sci Res*. 2020; 9(9):16-17.
8. Kite L, Uppal T. Ultrasound of ovarian dermoids - sonographic findings of a dermoid cyst in a 41-year-old woman with an elevated serum hCG. *Australas J Ultrasound Med*. 2011 Aug; 14(3):19-21.
9. Lee R, Dupuis C, Chen B, Smith A, Kim YH. Diagnosing ectopic pregnancy in the emergency setting. *Ultrasonography*. 2018 Jan; 37(1):78-87.
10. Woźniak A, Woźniak S. Ultrasonography of uterine leiomyomas. *Prz Menopauzalny*. 2017 Dec; 16(4):113-117.
11. Zafar N, Kupesic Plavsic S. Role of Ultrasound in the Evaluation of Acute Pelvic Pain in Nonpregnant Reproductive Age Patients. *Donald School J Ultrasound Obstet Gynecol* 2012; 6(2):207-217.