www.jmscr.igmpublication.org
Impact Factor (SJIF): 6.379
Index Copernicus Value: 79.54
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossrefDOI: https://dx.doi.org/10.18535/jmscr/v6i10.200

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

A Study on Accuracy of Ultrasound Imaging in Diagnosing Adnexal Masses Presenting with Acute Symptoms by Clinicopathological Correlation

Authors
Dr Tamilarasi.V[1*], Prof Dr Adaikkappan[2], Prof Dr Lavanyakumari[3]
[*1]Post Graduate Student, Department of Radiodiagnosis, RMMCH,
Annamalai University, Chidambaram - 608 002, Tamil Nadu, India
[2]Professor and Head, Department of Radiodiagnosis, RMMCH,
Annamalai University, Chidambaram - 608 002, Tamil Nadu, India
[3]Professor and Head, Department of Obstetrics and Gyneacology, RMMCH,
Annamalai University, Chidambaram - 608 002, Tamil Nadu, India
Corresponding Author
Prof Dr Lavanyakumari
Professor and Head, Department of Obstetrics and Gyneacology, RMMCH,
Annamalai University, Chidambaram - 608 002, Tamil Nadu, India
Email: *Lavanyakumari-009@yahoo.co.in*

Abstract
Transvaginal ultra sound imaging aids as a noninvasive modality to diagnose most of the adnexal pathologies presenting with acute abdomen. An observational study is done to determine the accuracy of ultrasound imaging in the evaluation and characterization of adnexal masses presenting as acute abdomen by correlating the results with histopathological diagnosis. Of the total of 67 patients in the study population, 28 patients presented with acute abdomen. The ultrasound imaging was diagnostic in 7 (25%) cases and contributory to diagnosis in 21(75%) cases.
Background: *Abdominal pain is one of the most common presentations of adnexal pathology in gynecology. Early diagnosis and intervention is necessary in adolescent girls and reproductive age group women to conserve reproductive function.*
Aim: *This study is done to determine the accuracy of ultrasound imaging in the evaluation and characterization of adnexal masses presenting as acute abdomen by correlating the results with histopathological diagnosis. Transvaginal Ultrasound imaging aids as a noninvasive modality to diagnose most of the adnexal pathologies presenting with acute abdominal pain.*
Keywords: *Adnexal, acute, torsion, hemorrhage, Rupture, diagnostic, contributory.*

Introduction

Abdominal pain is one of the most common presentations of adnexal pathology in gynecology. Other than the life threatening early pregnancy related complication -ruptured ectopic, common causes of acute abdominal pain are torsion and hemorrhage which are the complications of adnexal masses[2]. Early diagnosis and intervention is necessary in adolescent girls and in reproductive age group women to conserve reproductive function.

Materials and Methods

Study Design: Observational-cross sectional study

Source of Data: Patients referred to the Department of radio diagnosis with acute abdominal pain and clinical suspicion of adnexal pathology for ultrasound examination.

Study Period: January 2017 to October 2018

Study Population: 67 patients referred to the department of radio diagnosis with clinically suspected adnexal masses during the study period. 28 patients out of 67 presented with acute abdominal pain.

Methodology

- Detailed history taking
- Explaining the details of the procedure to the patient.
- A structured proforma used to enter the patient details, clinical history, Clinical examination findings and relevant investigations.
- Ultrasound examination of the pelvic organs performed on high-end ultrasound and Doppler machine-Siemens Accuson Antares. Convex probe (2 – 6 MHz), Linear Probe (7.5-12 MHz), Transvaginal probe (4 -9 MHz)
- Transabdominal examination, Transvaginal examination
- Doppler study-colour Doppler, power Doppler, spectral Doppler
- Lesions are reported based on specific ultrasound characteristics[15]. Results are analysed and compared with clinico-pathological findings to estimate the accuracy of ultrasound imaging in diagnosing adnexal pathologies.

Results

Of the total of 67 patients in the study population, 28 patients presented with acute abdomen. Most common cause of acute abdomen in the study population was found to be ruptured ectopic-19(67.8%) followed by Serous cystadenoma - complicated by torsion, rupture- 4 cases (14%) and Dermoid cyst-complicated by torsion-2 in number (7%).

Conclusion

Other than the life threatening early pregnancy related complication -ruptured ectopic, complications of adnexal masses such as torsion, hemorrhage, rupture are the common causes of acute abdominal pain due to adnexal pathology, in this study.

The ultrasound imaging was diagnostic in 7 (25%) cases and contributory in 21(75%) cases.

Acute abdominal conditions due to adnexal pathologies in the study population can be grouped into those associated with pregnancy and others.

- **Associated with pregnancy**
  - Ruptured ectopic gestation-19
  - Torsion Dermoid cyst-1
  - Ruptured serous cystadenoma -1
- **Others**
  - Torsion serous cystadenoma-3
  - Torsion Dermoid cyst-1
  - Torsion of normal ovary-1
  - Ruptured Endometrioma-1
  - Ruptured hemorrhagic cyst -1

Ruptured ectopic gestation

In 21 patients with proven ectopic pregnancy, 19 cases presented as acute abdomen, ultrasound imaging contributed to diagnosis in 17 cases (89.4%) and could diagnose two cases (10.5%) which is comparable to other studies.

The diagnosis of ectopic gestation required clinical and biochemical correlation in addition to specific ultrasound findings. Ultrasonography could rule out an intrauterine pregnancy in all the patients. However, the demonstration of a viable extra-uterine pregnancy was not possible in most patients. Using a combination of criteria viz., a complex adnexal mass adjacent to an enlarged empty uterus, pseudo-gestational sac with echogenic rim and free fluid in the pouch of Douglas, we obtained correlation in most of the patients.

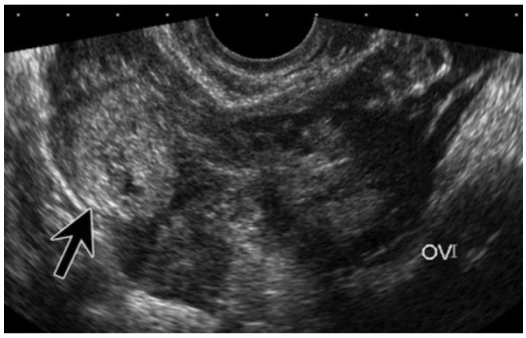


Fig: 1 Tubal ring sign

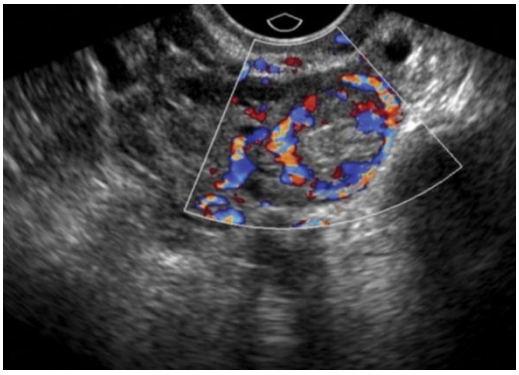


Fig: 2 Ring of fire - Bagel sign

A complex extra ovarian adnexal mass with echogenic ring (tubal ring sign) could be demonstrated in 14 cases (73.6%).[14]

Adnexal mass with fetal pole and cardiac activity could be demonstrated in two cases (10.5%); Ring of fire sign (Bagel sign) and free fluid in cul-de-sac could be demonstrated in almost all the cases.

Two cases (10.5%) had ovarian ectopic -atypical echogenic cyst in the ovary with rupture. Pseudogestational sac in the uterine cavity was seen in 3 cases (15%).

2 cases (10.5%) presented with hemoperitoneum alone, without any evidence of any mass lesion.

These results were correlating with previous studies.

Fig: 3 Extra ovarian adenexal mass with Fetal pole and cardiac activity

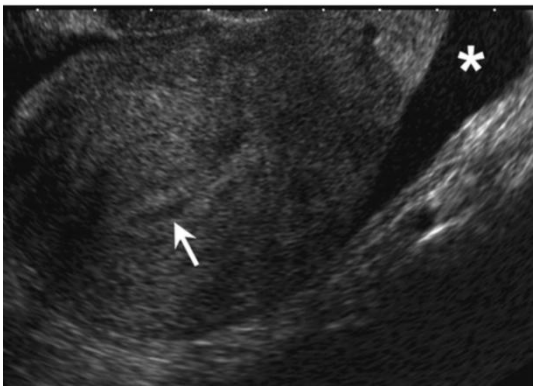


Fig: 4 Pseudo gestational sac

Torsion ovarian cyst

Of the 5 patients, diagnosed as torsion, two were serous cystadenoma[11] (one of which was associated with pregnancy) other two were dermoid cysts (one of which was associated with pregnancy).

One of which was normal ovary that had undergone torsion, due to torsion of long mesosalphinx.[3,5]

In up to 74% of cases, ultrasound imaging may demonstrate multiple small (up to 25 mm), uniform cysts aligned in the periphery of the engorged ovary. Unilateral enlargement of ovary with peripherally arranged follicles with pain abdomen are helpful in diagnosing ovarian torsion. Free fluid in the pouch of Douglas has been detected in up to 87% of cases of ovarian torsion. Decreased or absent venous flow is the most frequent finding (93%), which may reflect the early collapse of the compliant venous walls. A twisted vascular pedicle- whirlpool sign was detected in 88% of cases of ovarian torsion as per the study by Lee et al.

In our study, free fluid was present in all the cases of torsion[9]. Multiple peripherally arranged cysts found in one case (20%); absent venous flow demonstrated in two cases (40%). whirlpool sign was found in one case (20%). The imaging results were diagnostic in 50% cases; contributory in 50% cases.

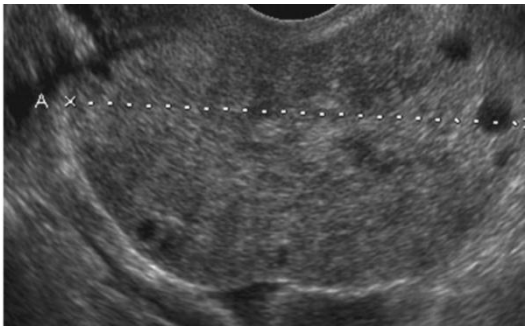


Fig: 5 Enlarged ovary with peripherally arranged follicles[14]

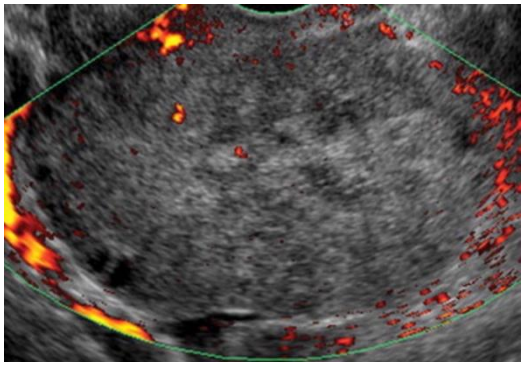


Fig: 6 Torsed ovary with grossly diminished blood flow

Gray-Scale US Features of Ovarian Torsion

Unilateral enlarged ovary (>4 cm)*
String of pearls sign
Coexistent mass within the twisted ovary
Free pelvic fluid
Twisted vascular pedicle

*Usually located in the midline and superior to the fundus of the uterus.

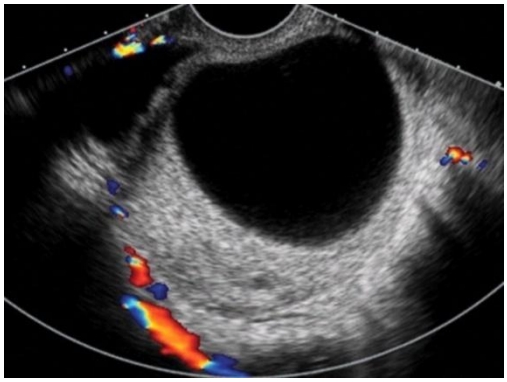


Fig: 7 Serous cystadenoma with torsion[19,20]

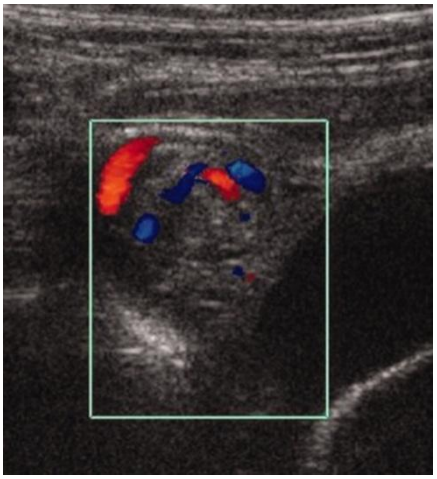


Fig: 8 Whirlpool sign

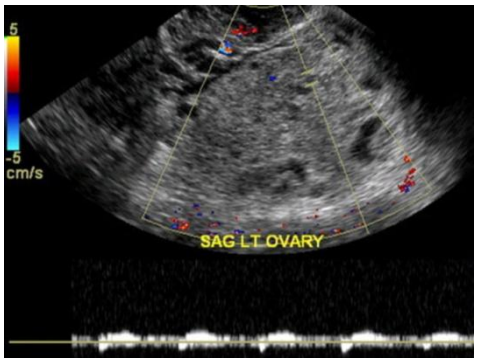


Fig: 9 Duplex ultra sound image with grossly diminished arterial blood flow

Fig: 10 Torsed dermoid cyst[20]

Ruptured ovarian cyst

Other emergencies were three ruptured ovarian cysts.

1. Ruptured serous cystadenoma-1-presented as complex ovarian cyst with massive amount of echogenic free fluid along with evidence of incomplete abortion.
2. Ruptured endometriotic cyst -1
3. Ruptured hemorrhagic cyst-1

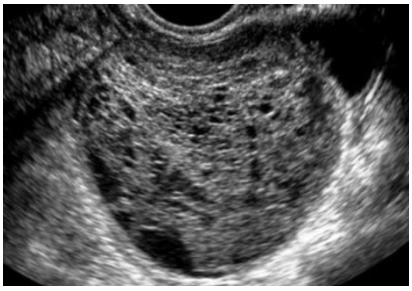


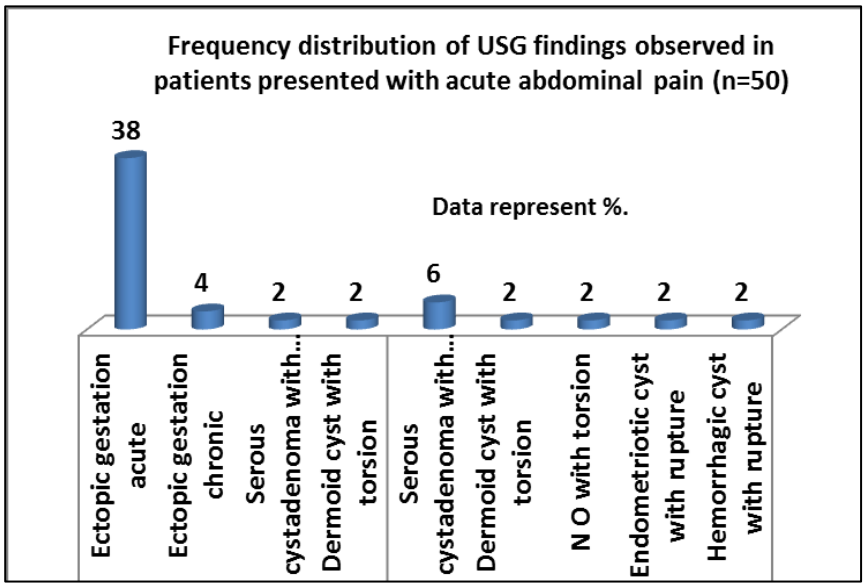
Fig: 11 Ruptured hemorrhagic cyst

Fig: 12 Ruptured Endometrioma

All the lesions necessitated laparotomy[1].
Ultrasound imaging reports were diagnostic in 2 cases (66.6%) and contributory in one case (33.3%).

Frequency distribution of USG findings observed in patients presented with acute abdominal pain.

S. No	Category of abdominal pain	USG findings	n	%
1	Associated with Pregnancy	Ectopic gestation Acute	19	38
		Serous cystadenoma with rupture	1	2
		Dermoid cyst with torsion	1	2
2	Others	Serous cystadenoma with torsion	3	6
		Dermoid cyst with torsion	1	2
		Normal ovary with torsion	1	2
		Endometriotic cyst with rupture	1	2
		Hemorrhagic cyst with rupture	1	2



Conclusion

US results were 25% diagnostic and 75% contributory; thus diagnosis could be arrived at in almost all the cases of acute abdomen due to adnexal pathology. Results are analysed as either diagnostic or contributory. None of the results were erroneous.

Diagnostic- ability of the test to exactly diagnose the disease condition matching with histopathology *Contributory* - ability of the test to play a part in arriving at the diagnosis including origin, location, texture and consistency but not exactly matching with the histopathology.

Accuracy of ultrasound imaging in diagnosing adnexal masses presenting with acute abdomen

S. No	Method	Total number of Cases	Diagnostic		Contributory	
			n	%	n	%
1	USG	28	7	25	21	75

Bibliography

1. Likelihood Ratio of Sonographic Findings for the Diagnosis of Hemorrhagic Ovarian Cysts by Maitray D. Patel, MD, Vickie A. Feldstein, MD and Roy A. Filly, MD2005 J Ultrasound Med 24:607-614
2. Webb EM, Green GE, Scoutt LM. Adnexal mass with pelvic pain.RadiolClin North Am. 2004; 42:329–48. [PubMed]
3. Damigos E, Johns J, Ross J. An update on the diagnosis and management of ovarian torsion.The Obstetrician and Gynecologist. 2012;14:229–36.
4. Balci O, Icen MS, Mahmoud AS, Capar M, Colakoglu MC. Management and outcomes of adnexal torsion: A 5-year experience. Arch Gynecol Obstet. 2011;284:643–6. [PubMed]
5. Göçmen A, Karaca M, Sari A. Conservative laparoscopic approach to adnexal torsion. Arch Gynecol Obstet. 2008;277:535–8. [PubMed]
6. Alkatout I, Mettler L, Anlauf M, Jonat W, Eckmann-Scholz C, Schollmeyer T. Management of adnexal torsion by laparoscopic approach. Gynecol Surg. 2012;9:405–9.
7. Erdemoğlu M, Kuyumcuoglu U, Guzel AI. Clinical experience of adnexal torsion: Evaluation of 143 cases. J Exp Ther Oncol. 2011;9:171–4. [PubMed]
8. American College of Radiology. ACR Appro- priateness Criteria 2008: clinically suspected adnexal mass. American College of Radiology Web site.Available at http://www.acr.org/ SecondaryMainMenuCategories/quality_ safety/ app_criteria/ pdf/ Expert Panelon Womens Imaging/ Suspected Adnexal Masses- Doc11.aspx. Accessed November 9, 2009.
9. Liu J, Xu Y, Wang J. Ultrasonography, com- puted tomography and magnetic resonance imaging for diagnosis of ovarian carcinoma. Eur J Radiol 2007;62:328–334.
10. Patel MD. Practical approach to the adnexal mass.RadiolClin North Am 2006;44:879– 899.
11. Geomini P, Kruitwagen R, Bremer GL, Cnossen J, Mol BW. The accuracy of risk scores in predicting ovarian malignancy: a systematic review. ObstetGynecol 2009;113:384–394.
12. Timmerman D, Schwarzler P, Collins WP, et al. Subjective assessment of adnexal masses with the use of ultrasonography: an analysis of interobserver variability and experience. Ultrasound Obstet Gynecol 1999;13:11–16.
13. Valentin L. Use of morphology to character- ize and manage common adnexal masses. Best Pract Res Clin Obstet Gynaecol 2004; 18:71–89.
14. Kinkel K, Lu Y, Mehdizade A, Pelte MF, Hricak H. Indeterminate ovarian mass at US: incremental value of second imaging test for characterization–meta-analysis and Bayesian analysis. Radiology 2005; 236:85–94.
15. Moszynski R, Szpurek D, Smolen A, Sajdak S. Comparison of diagnostic usefulness of predictive models in preliminary differentiation of adnexal masses. Int J Gynecol Cancer 2006;16:45–51.
16. Van Holsbeke C, Yazbek J, Holland TK, et al. Real-time ultrasound vs evaluation of static images in the preoperative assessment of adnexal masses. Ultrasound ObstetGynecol 2008;32:828–831.
17. Brown DL, Doubilet PM, Miller FH, et al. Benign and malignant ovarian masses:

selec- tion of the most discriminating gray-scale and Doppler sonographic features. Radiology 1998;208:103–110.

18. Granberg S, Wikland M, Jansson I. Macro-scopic characterization of ovarian tumors and the relation to the histological diagnosis: criteria to be used for ultrasound evaluation. GynecolOncol 1989;35:139–144.
19. Timmerman D, Valentin L, Bourne TH, Collins WP, Verrelst H, Vergote I. Terms, definitions and measurements to describe the sonographic features of adnexal tumors: a consensus opinion from the International Ovarian Tumor Analysis (IOTA) Group. Ul- trasound Obstet Gynecol 2000;16:500–505.
20. Ekerhovd E, Wienerroith H, Staudach A, Granberg S. Preoperative assessment of uni- locular adnexal cysts by transvaginal ultrasonography: a comparison between ultrasonographic morphologic imaging and histopathologic diagnosis. Am J ObstetGynecol 2001;184:48– 54.