SYSTEMIC REVIEW

Accuracy of Gynecology Imaging Reporting and Data System Based Upon Ultrasound Evaluation of Adnexal Lesions: A Systematic Review

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ABSTRACT

Background: Globally as growing occurrence ratio of ovarian cancer as well as efficacy of Gynecologic-Imaging Reporting-and-Data-System GI-RADS to diagnose pathologies like ovaries cancer, we designed for evaluating the presentation of diagnosis of this system to differentiate among the adnexal benign and malignant lesions. For routine gynecologic examinations, pelvic ultrasound is generally used, consequential in analysis of adnexal lesions, main stream of which are benign or functional. Though, because of probable difficulties including benign adnexal cyst (i.e. pelvic pain and adnexal torsion) as well as ultimate significance of initial analysis as well as cure of ovarian cancer, precise ultrasound analysis of adnexal lesions is important in clinical run through

Methods: We searched google scholar and pubmed form 2000 to December 2019. Selection criteria reporting on the accuracy of GI-R-A-D-S system in ultrasound.

Results: In this study, we evaluated 197 women with suspected appendicitis. The proportions of GI-RADS II, III, IV and V were 34.5 (69 cases), 38.0 (76 cases), 19.5 (39 cases) and 6.5 (13 cases). For the high-risk and low-risk GI-RADS subtypes, 72.5% were classified as GI-RADS II and III, and 26 were classified as GI-RADS IV and V, respectively. Conclusive histopathologic analysis was testified for 158 cases. Histopathologic assessment designated that 12(7.6%) of were malignant masses as well as 146(92.6%) were benign. Associating by histopathologic analysis, the GIRADS system specificity, sensitivity, negative predictive value and positive predictive value, as well as negative LR were 91.6, 80.82, 28.2, 99.1, 4.77, and 0.10, correspondingly. The accurateness of the scoring system was 81.64%.

Conclusion: This systemic review concluded that by Gynecologic-Imaging-Reporting-Data System, we could measure the possibility of malignant stage through such an organized along with modest recording system thus that system could be valuable in clinician to perform a suitable clinical organization

Keywords: Adnexal Diseases, Ovarian Neoplasms, Ultrasonography.

INTRODUCTION

In females of all ages, one of common problems of gynecology are adnexal masses. Etiology of the lesion could be benign for instance usual luteal cyst, polycystic ovaries and tubo-ovarian abscess, or malignant involving sarcoma, cyst adenocarcinoma, metastasis and ovarian carcinoma.[1]The lifetime threat of evaluation of adnexal masses through surgical procedure for a females can be predicted to be 5% to 10%

As there is no non-invasive analytical instrument to diagnose ovarian cancer, utmost significant method for adnexal lesions assessment is eliminating malignancy. However occurrence of ovarian cancer is not in elevation as well as it comprises 3-% of all cancer's in females[2].

Primary radiologic tool to evaluate adnexal lesions is ultrasonography. It is low-cost as well as safe imaging method to differentiate malignant as well as benign lesions by suitable specificity as well as sensitivity proportion (90%–93%).[3,4] Facts designated that the occurrence of certain features of ultrasonography for instance thick septation, solid-component, bilateral lesions, ascites presence, large lesion size (>6 cm) and nodularity intensify the malignancy vulnerability. Furthermore, based on findings of ultrasonography of patient among adnexal lesion, diverse scoring system or array identification tactics for instance modest evocative scoring system, mathematically developed scoring systems, examiner's subjective impression, logistic regression models and GIRADS System have been projected in numerous studies[5,6].

While entire declared systems have been utilized to characterize adnexal lesions, there is quiet countless difference in their usefulness, as well as supremacy of one of the above mentioned methods has not been resolute yet[7].

It is recommended that a designed reporting system of ultrasonography would be extra valuable if it has suitable clinical utility mode that advances the clinician and radiologist communiqué[8].

One of the reporting systems which has been advanced lately is GIRADS System, as well as sign GIRAD System in clinical run through has also been stated in rare studies. In given table show the comparison between GIRADS System classification, estimate of malignancy and sonographic features:

GIRAD Category	Examination of probability of malignancy	Imaging features
I	0%	Normal adnexa
II	<1%	Additional functional damage, cyst, corpus luteum, hemorrhagic cyst
III	1-4%	Benign adnexal lesion's: PID, Cyst
IV	5-20%	In addition, for any lesion's that is not included in GI-RADS 1–3 , the lesion presents one or two signs indicative of malignancy such as: thickened papillae, thickened septum, solid areas, ascites.
V	>20%	Mass and more finding related to malignant tumor

Therefore, as growing occurrence ratio of ovarian cancer as well as the benefit of this system to diagnose malignant adnexal lesion involving ovaries.

This study is designed for evaluating the presentation of diagnosis of this reporting system to differentiate among the adnexal benign and malignant lesions. Since there are rare studies, this study results would be convenient to provide further brief consequences in this field as well as improved organization of high risk cases.

MATERIAL AND METHODS

We conducted a systematic review using an established methodology to investigate test accuracy and a potential recorded procedure after permission from IRB. We reported the results of our review in accordance with established guidelines.

Research Strategy: The search was conducted in accordance with the principles of Systematic Reviews. The searched databases were**: Google scholar, and Pub Med.**

Inclusion / Exclusion Criteria and Study Design Selection: The selection criteria include those studies that include patient with suspected adnexal mass. In this systemic review, females with alleged adnexal lesion diagnosed for evaluation of ultrasonography were included. All irrelevant studies to our research tittle, randomized control/clinical trials (RCTs), and non-matched retrospective & prospective studies and chart reviews were excluded because of their biased results. All relevant observational (cross-sectional) studies were included.

RESULTS AND DISCUSSION

In this study, we assessed the performance of GIRAD-System, to diagnose malignancy of adenxal lesions. It is evident that interpretation of radiology report is not as modest as we consider straight for doctor as it can have certain explanations, which not entirely other doctors be able to examine it factual alike fresco unit of cyst, RI, vital as marginal vascularity[9].

The Gynecologic Imaging Reporting and Data System, obviously, had basic report considerate designed for other doctors as well as consequently it assistances in healthier decision making for the patient. Our consequences designated that structure has suitable sensitivity as well as suitable specificity to distinguish cases of malignancy. Overall, it is recommended that Gynecologic Imaging Reporting and Data System might be consumed as an analytic instrument in this respect[10-11].

Preceding studies had highlighted upon by a synoptic reporting instrument intended for correct organization of adnexal lesion. Though, a non-structured reporting system can consequence in unprovoked apprehension for mutually clinician as well as patient[12-13]. So, by means of such reporting system appear to be essential. However there are certain suitable system of report like IOTA standards that practicality have been assessed in particular revisions, such reporting system of report in every region or center should be designated created upon their accommodations as well as significances. In this study, we have assessed the usefulness of lately settled so called Gynecologic Imaging Reporting and Data System in this field.

Gynecologic Imaging Reporting and Data System was first termed through Amor et al in 2009, they assessed 187 cases by projected G-I-R-A-D-S System as well as associated by ultimate histo-pathologic analysis. Frequency of System II, III, IV, and V were 27.8%, 48.1%, 7%, and 15%, correspondingly. Their stated specificity, sensitivity, NPV, PPV, as well as accurateness System were 97%, 92%, 99%, 85%, 96%, correspondingly. They decided that the system could be a good investigative tool that could improve communiqué between clinician as well as radiologist besides so assist procedure of decision making. They optional for planning potential revisions for obtaining additional decisive consequences in this field[14].

Amor et al accompanied another multi-center eventual study in 2008 of 3 years duration as well as assessed clinical efficacy of System to assess adnexal lesions. They assessed 432 patients with adnexal lesion, they comprised lesions with System II to V score's. Frequency of this System II, III, IV, and V were 21%, 43%, 9%, besides 27%, correspondingly. Their reported specificity, sensitivity, NPV, PPV, as well as accurateness sensitivity, specificity, PPV, NPV, and accuracy for GIRADS System were 85.9%, 99.1%, 99.6%, and 71.1%, correspondingly. LR- as well as LR+ were 0.01 and 7.05, correspondingly. Their results acknowledged the consequences of their preceding revisions[15-16].

In other latest study, Zhang et al have assessed the analytic presentation of GIRADS System in 242 cases in their study. According to their results, 84.3% specificity, 96.4% sensitivity, as well as 89.3% accuracy of the system. Likewise, they correspondingly inveterate utility of structure to diagnose malignant lesion.[17]Another similar study was conduct by Zhang and colleagues, they directed a retroactive revision above 263 adnexal lesions as well as determined that solid areas, thick wall, central blood flow and solid papillary projections were accompanying by malignant lesion. The specificity and sensitivity of GIRADS System were 84.3% and 96.4%, correspondingly. 112 masses were dispersed through G-I-R-A-D-S System sorting as resulting: GI-RADS 2: 36 (32.1%), GIRADS 3: 32 (28.6%), GIRADS 4: 13(11.6%), as well as GIRADS 5: 31(27.7%). Ovarian neoplastic lesion signified 55(49%) lesions in our study. The analytic accurateness of GIRADS System cataloguing in ovarian neoplastic lesions valuation conferring to results of ultrasound as well as directed through histo-pathological cataloguing were 97% sensitivity, 73% specificity, 84% PPV, 94% NPV, as well as 87% accuracy correspondingly[18].

Findings of this study were according to cited studies among 91.6% sensitivity, 80.8% specificity, as well as 81.64% accuracy, correspondingly[19]. For malignant cases, AUC of ROC curve was 0.856. Consequently, it appears that scoring system offers a complete consistent report based upon features of ultrasonography of lesions might be utilized as a suitable united reporting system through sonographer intended for clinicians[20].

Another study conduct that collective GR 4 as well as GR 5 were considerably well than GR 5 only within forecasting malignancy of AMs. ROC extents of collective GR4 and GR5 were considerably larger to GR 5 unaccompanied (p=0.047). Furthermore, among this amalgamation, NPV as well as sensitivity remained considerably enlarged (98.4% as well as 97.6%, correspondingly), while PPV as well as specificity were slightly diminished (91.2% as well as 93.9%, correspondingly). Therefore, we must conglomerate together GR 4 as well as GR 5 to diagnose malignant AMs as uncertainty we deliberate GR 5 only as decisive to diagnose malignant AMs, Gynecologic Imaging Reporting and Data System would slip pertinent quantity of malignant AMs[21].

Sajdak et al stated that certain malignant lesions might quiet be originate amongst those measured benign lesions particularly inside unpredicted people, e.g. pre-menopausal patient. In our study, we originated 9 false negative patients as well as 5 false positive patients. False negative patients were as follow: 3 serious cysta-denocarcinomas as well as 2 mucinous cysta-denocarcinomas identified as suspected benign lesions, 2 granulosa cell masses identified by way of tubo ovarian fibroma as well as abscess, 1 germ-cell lesion identified as alleged benign tumor, as well as 1 malignant stromal lesion identified by way of fibroma. Upon other hand, 5 false-positive patients were as follow: 1 serious cystadenoma as well as 2 mucinous cystadenoma among pertinent interior vascularity identified by way of carcinoma, 1 mature cystic-teratoma among big hard constituent identified by way of carcinoma, as well as 1 tubo ovarian eruption identified by way of border line mass. Entirely false positive patients were screening forms stated through Alcázar et.al. , in an article issued about analytic presentation of US for exact analysis of AMs[22,23].

Recent deta examination showed that specificity and sensitivity of pelvic-ultrasound to diagnose malignant adnexal lesion mostly ovarian cancer were 68% to 83% and 86% to 91% correspondingly.

CONCLUSION

From this eventual study, it concluded that classification accomplishes fine by way of reporting systems of adnexal lesions as well as appears to be convenient for clinical decision making. Results showed that by Gynecologic Imaging Reporting and Data System, count threat of malignancy through such a planned and

modest reporting system consequently system might be beneficial for clinicians to perform a suitable clinical organization.

Fig. 1: This image shows that serous cysta-denocarcinomas of ovary in 60 years old female. Trans-vaginal US probe demonstrations a multifaceted ovarian-cyst (calipers) among numerous thick-septa (arrows) as well as hard zones. Classified as Gynecologic Imaging Reporting and Data System 5.

Fig. 2: This image shows that nearby cysts pretending a septated cystic lesion in 38 years old female. Trans-vaginal US probe demonstrations numerous nearby ovarian-cysts wherever the superseding ovarian-stroma (arrows) pretends septa in larger cystic-mass.Confidential as Gynecologic Imaging Reporting and Data System 4.

REFERENCES

1. Glanc P, Benacerraf B, Bourne T, Brown D, Coleman BG, Crum C, et al. First international consensus report on adnexal masses: Management recommendations. J Ultrasound Med. 2017;36:849–63.
2. Perera DS, Prabhakar HB. Imaging of the adnexal mass. Clin Obstet Gynecol. 2015;58:28–46.
3. Dodge JE, Covens AL, Lacchetti C, Elit LM, Le T, Devries-Aboud M, et al. Preoperative identification of a suspicious adnexal mass: A systematic review and meta-analysis. Gynecol Oncol. 2012;126:157–66.
4. Smorgick N, Maymon R. Assessment of adnexal masses using ultrasound: A practical review. Int J Womens Health. 2014;6:857–63.
5. Brown DL. A practical approach to the ultrasound characterization of adnexal masses. Ultrasound Q. 2007;23:87–105.
6. Patel MD, Ascher SM, Paspulati RM, Shanbhogue AK, Siegelman ES, Stein MW, et al. Managing incidental findings on abdominal and pelvic CT and MRI, part 1: White paper of the ACR incidental findings committee II on adnexal findings. J Am Coll Radiol. 2013;10:675–81.
7. Alcázar JL, Errasti T, Laparte C, Jurado M, López-García G. Assessment of a new logistic model in the preoperative evaluation of adnexal masses. J Ultrasound Med. 2001;20:841–8.
8. Timmerman D, Verrelst H, Bourne TH, De Moor B, Collins WP, Vergote I, et al. Artificial neural network models for the preoperative discrimination between malignant and benign adnexal masses. Ultrasound Obstet Gynecol. 2009;13:17–25.
9. Alcázar JL, Mercé LT, Laparte C, Jurado M, López-García G. A new scoring system to differentiate benign from malignant adnexal masses. Am J Obstet Gynecol. 2003;188:685–92.
10. Amor F, Vaccaro H, Alcázar JL, León M, Craig JM, Martinez J. Gynecologic imaging reporting and data system: A new proposal for classifying adnexal masses on the basis of sonographic findings. J Ultrasound Med. 2009;28:285–91.
11. Levine D, Brown DL, Andreotti RF, Benacerraf B, Benson CB, Brewster WR, et al. Management of asymptomatic ovarian and other adnexal cysts imaged at US: Society of radiologists in ultrasound consensus conference statement. Radiology. 2010;256:943–54.
12. Amor F, Alcázar JL, Vaccaro H, León M, Iturra A. GI-RADS reporting system for ultrasound evaluation of adnexal masses in clinical practice: A prospective multicenter study. Ultrasound Obstet Gynecol. 2011;38:450–5.
13. Zhang T, Li F, Liu J, Zhang S. Diagnostic performance of the gynecology imaging reporting and data system for malignant adnexal masses. Int J Gynaecol Obstet. 2017;137:325–31.
14. Moradi Y, Jafari M, Chaichian S, Khateri S, Akbarian A, Moazzami B, et al. Trends in ovarian cancer incidence in Iran. Iran J Cancer Prev. 2016;9:e5452.
15. Brown DL, Dudiak KM, Laing FC. Adnexal masses: US characterization and reporting. Radiology. 2010;254:342–54.
16. Le T, Fayadh RA, Menard C, Hicks-Boucher W, Faught W, Hopkins L, et al. Variations in ultrasound reporting on patients referred for investigation of ovarian masses. J Obstet Gynaecol Can. 2008; 30:902–6.
17. Timmerman D, Valentin L, Bourne TH, Collins WP, Verrelst H, Vergote I et al. Terms, definitions and measurements to describe the sonographic features of adnexal tumors: A consensus opinion from the international ovarian tumor analysis (IOTA) group. Ultrasound Obstet Gynecol. 2000;16:500–5.
18. Valentin L, Ameye L, Jurkovic D, Metzger U, Lécuru F, Van Huffel S, et al. Which extrauterine pelvic masses are difficult to correctly classify as benign or malignant on the basis of ultrasound findings and is there a way of making a correct diagnosis? Ultrasound Obstet Gynecol. 2006;27:438–44.
19. Sokalska A, Timmerman D, Testa AC, Van Holsbeke C, Lissoni AA, Leone FP, et al. Diagnostic accuracy of transvaginal ultrasound examination for assigning a specific diagnosis to adnexal masses. Ultrasound Obstet Gynecol. 2009;34:462–70.
20. Myers ER, Bastian LA, Havrilesky LJ, Kulasingam SL, Terplan MS, Cline KE, et al. Management of adnexal mass. Evid Rep Technol Assess (Full Rep) 2006;(130):1–145.
21. Zhang T, Li F, Liu J, Zhang S. Diagnostic performance of the gynecology imaging reporting and data system for malignant adnexal masses. International Journal of Gynecology & Obstetrics. 2017 Jun;137(3):325-31.
22. Sajdak S, Szubert S, Moszynski R, Szpurek D. Analysis of false negative results of subjective ultrasonography assessment of adnexal masses. Ginekologia polska. 2013;84(2).
23. Rakheja R, Makis W, Hickeson M. Bilateral Tubo-Ovarian Abscess Mimics Ovarian Cancer on MRI and 18 F-FDG PET/CT. Nuclear medicine and molecular imaging. 2011 Sep 1;45(3):223-8.