ORIGINAL ARTICLE

Diagnostic Performance of Ultrasound in Predicting the Extension of Disease in Advanced Ovarian Cancer

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ABSTRACT

Aim: To assess the diagnostic performance of ultrasound in predicting the extension of disease in advanced ovarian cancer.
Study design: Prospective observational study.
Place and duration of study: Department of Obstetrics & Gynaecology, Islam Teaching Hospital, Sialkot from 1st July 2020 to 30th June 2021.
Methodology: Fifty-nine patients were enrolled and each patient underwent ultrasonography preoperatively and was assigned a six Fagotti-score. Surgical removal of ovarian mass was done through laparotomy. Midline incision was given. Peritoneal washings were taken for cytology. Omental biopsies were taken from various sites. Total abdominal hysterectomy was performed with bilateral oophorectomy. The ultrasound results and intraoperative extent of the ovarian malignancy spread were compared. The Cohen's Kappa results were interpreted.
Results: The mean age was 51.5±5.2 years. The range of Cohens Kappa was 0.7 in cases of carcinomatosis presented on the smaller/larger bowel. The predictive agreement value between the ultrasound and surgical cases for Cohens Kappa was 0.75 and 0.73 with mean as 0.74.
Conclusion: The ultrasonography can be used as an important tool in identifying the advancement extent of ovarian cancer.
Keywords: Ovarian cancer, Ultrasound, Cohen's Kappa

INTRODUCTION

Ovarian Cancer (CA-125) has been identified as the highest mortality causing cancer within females all over the globe. Majority of the women who are diagnosed with ovarian carcinoma are already at an advanced stage of their cancer as early diagnosis of ovarian cancers is very difficult to make[1,2]. In worldwide cases the survival rate in advanced cases of ovarian cancer has been reported as less than 50% for five years. Identification of malignancy in timely manner is crucial for better outcomes of the survival in ovarian cancer patients[3].

Ultrasound is considered as a safe and non-invasive protocol which can identify benign as well as malignant ovarian cancers.[4] Various guidelines are available which can assist in risk assessment of ovarian malignancy and mass production[5] and various ultrasound techniques can identify the stage of advancement of ovarian cancer which can be extremely useful in timely treatment and enhancing the patient survival rate[6-9]. Tumor markers have an additional important role in identification of ovarian cancer which can be correlated with the ultrasonographical imaging report[10].

The present study was designed to assess the role of ultrasound in assessing the ovarian cancer disease extension by using Cohens Kappa analysis. The Cohens Kappa is found a useful metric tool in identifying agreement between two ratters as in this case it was applied to assess the agreement between ultrasound identification of disease extension with the post-operative result.

MATERIALS AND METHODS

This prospective observational study was conducted at Department of Obstetrics & Gynaecology, Islam Teaching Hospital Sialkot in collaborated with the Radiology Department from 1st July 2020 to 30th June 2021. After approval from Ethical Committee, an informed consent was taken from each participant pre-initiation of the data collection and examination of patients enrolled. The enrolled patients in current study were under a suspicion of CA-

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125 such as ovarian cancer based on their clinical signs and symptoms as well as physical examination. There were fifty-nine patients selected. The sample size was calculated through on basis of ovarian cancer prevalence in Pakistan as 13.6%. The margin of error was 59 patients taken as 7% while 80% was the power of test with 95% CI. A 3cc blood was withdrawn from each patient for analyzing the biochemical tests as prolactin and CA-125 by separating the sera of each patient and refrigerating it at -20°C until analysis was conducted. Each patient underwent ultrasound assessment preoperatively and was assigned a six Fagotti-score. Surgical removal of ovarian mass and any other visible disease was performed through laparotomy. The extent of disease spread, noted at the time of surgery was then compared with the ultrasound results. The Cohen's Kappa results were interpreted in form of ≤0 as no agreement, 0.01-0.20 as no to slight and 0.21-0.40 taken as reasonable while 0.41-0.60 considered as moderate and 0.61–0.80 to be substantial, 0.81-1.0 was finally considered as approximately perfect-agreement. The occurrence of small bowel mesenteric-retraction as well as military-carcinomatosis above the serosa was completely evaluated. The results of each parameters were than assessed with laparotomy findings post operatively.

The concordance was then calculated by comparing the ultrasound findings with the laparotomy through Cohen's Kappa. Demographic as well as clinical and ultrasonographic details were documented. The data was later entered on SPSS for analysis using Kappa statistics calculation with p value significant as <0.001.

RESULTS

The mean age of the patients was 51.5±5.2 years with 15-35 years had highest number of patients under suspicion of ovarian cancer. However highest number of patients with confirmation of ovarian cancer were within the age group of 36-55 years (Table 1).

The range of Cohens Kappa was 0.7 in cases of carcinomatosis presented on the smaller/larger bowel while in supracolic-omentum it was 0.80 and 0.85 on the surface of liver and 0.90 in cases with carcinomatosis on diaphragm. There was no significant variance in the Cohen Kappa results of the surgical or ultrasound values (Table 2).

The predictive agreement value between the ultrasound and surgical cases for Cohens Kappa was 0.75 and 0.73 with mean as 0.74 while for mesenteric-retraction and military-carcinomatosis was 0.57 and 0.36 respectively (Table 3).

The intensity of ultrasonographical signal can be predicted by various ultrasound image which leads to identifying of the extent of the ovarian cancer (Fig. 1).

Table 1: Age wise distribution of positive and negative cases of ovarian cancer

Age (years)	Positive	Negative
15-35	8 (13.5%)	17 (28.8%)
36-55	19 (32.2%)	5 (8.4%)
>55	9 (15.2%)	1 (1.69%)
Total	36 (61.1%)	23 (38.9%)

Table 2: The Cohens Kappa value for various Carcinomatosis sites

Carcinomatosis	Cohens Kappa		P value
	USG	Surgical	
Small or large bowel	0.70	0.71	
Supracolic-omentum	0.80	0.79	
Liver surface	0.85	0.83	>0.001
Diaphragm	0.90	0.91	
Parietal peritoneum	0.62	0.61	
Stomach or spleen	0.53	0.54	

Table 3: Comparison of Cohens Kappa value with ultrasound and surgical scoring

Variables	Cohens Kappa	P value
	Predictive Indexed Value	
Ultrasound score	0.75	0.55
Surgical score	0.73	
Mesenteric retraction	0.57	0.49
Miliary carcinomatosis	0.36	

Fig 1: The gray scale-based ultrasound presents an irregular-solid tumor component shown in right part of adnexa
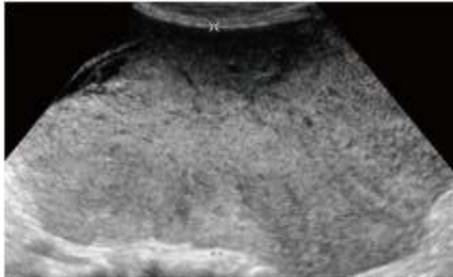
DISCUSSION

Open surgery via midline incision is now commonly used for removal of adnexal or ovarian masses with strong suspicion of malignant spread. The ultrasonography has major significant roles in evaluation of adnexal mass and screening patients who are under high risk of ovarian cancer[11,12]. The results of ultrasound are not only important in identifying the advancement of the ovarian cancer disease but are also important in comparison of benign lesions from the malignant without involvement of any invasive procedure[13,14]. In the current research there were 59 patients who were screened for the presence of ovarian cancer. These patients underwent ultrasound imaging. The morphological comparison o the ovaries including signs as the thickness of the wall with irregularities, papillary-projections as well as the solid components were main features for differentiation of the malignant lesions from the benign. The current research as well as studies elsewhere has presented data where ultrasound identification of the ovarian cancer advancement extent has 100 percent sensitivity and 83% specificity[15].

The extent of malignancy can be known through the combination of the ultrasound results with the menopausal status as well as the correlation of the biochemical analysis with the ultrasound reports[16]. The ultrasonography has a system of scoring for each feature related with ovarian index. Zero is the score with no features attributing towards malignancy while score 3 is assigned in condition where two or more than two features are highlighted[17].

Laparotomy has been extensively applied for removing of the adnexal mass or masses related with ovarian cancer. The present study also performed the similar method for comparing the extent of disease advancement presented through surgical procedure with the ultrasound reports. The Cohen's Kappa agreement analysis was used in the present study as well as other research as well with finding similar results as of this study[19]. There was a strong agreement in the results of the laparotomy with the ultrasound results[20].

CONCLUSION

There was a significant agreement in results of the ultrasound and surgery via laparotomy keeping in view all the parameters for intra-abdominal tumor staging. The ultrasonography can be used as an important tool in identifying the advancement and the extent of ovarian cancer.

Conflict of interest: Nil

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