ORIGINAL RESEARCH

A comparative analysis of CT imaging, CA-125, and Conventional Ultrasound in diagnosing and staging ovarian cancer

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ABSTRACT

Objectives: This study aimed to examine the diagnostic and staging accuracy of CA-125 serum stages, traditional ultrasound, and CT imaging in sufferers with ovarian cancer, with a focal point on their correlation with surgical-pathological findings.

Materials and Methods: A prospective cohort study was carried out concerning 150 patients with suspected ovarian cancer for a period of three years. Preoperative critiques protected CA-125 serum levels, conventional ultrasound, and CT imaging. Surgico-pathological findings were used as the gold general for diagnosis and staging. Sensitivity, specificity, a tremendous predictive fee (PPV), a bad predictive cost (NPV), and accuracy had been calculated for every diagnostic modality. Receiver running function (ROC) analysis was accomplished to determine top-quality cutoff values for CA-a 125. The correlation between imaging findings and surgical-pathological results becomes assessed using Spearman's rank correlation coefficient.

Results: Of the 150 patients, 110 had been recognized with ovarian cancers based on surgical-pathological findings. CA-125 confirmed a sensitivity of 82.7%, specificity of 68.5%, PPV of 89.2%, NPV of 57.8%, and a usual accuracy of 77.3%. Conventional ultrasound exhibited a sensitivity of 64.5%, specificity of 74.2%, PPV of 85.1%, NPV of 49.3%, and an average accuracy of 67.3%. CT imaging confirmed a sensitivity of 92.7%, specificity of 81.3%, PPV of 91.2%, NPV of 84.7%, and an ordinary accuracy of 88.7%. ROC analysis found the most efficient CA-125 cutoff value for diagnosing ovarian cancer.

Conclusion: CT imaging outperformed CA-125 and traditional ultrasound in both sensitivity and specificity for the prognosis and staging of ovarian cancer. While CA-125 remains a treasured biomarker, its diagnostic accuracy is more suitable when used together with imaging modalities. CT imaging, especially, affords a comprehensive assessment of ovarian cancer with excessive precision, assisting in more excellent specific surgical planning and affected person control. This study emphasizes the significance of a multimodal approach for the prognosis and staging of most ovarian cancers, in the end, enhancing patient consequences and treatment decisions.

Keywords- Ovarian cancer, CA-125, Conventional ultrasound, CT imaging, Diagnosis, Staging

INTRODUCTION

Ovarian cancer is an extensive fitness issue globally, with an excessive mortality fee because of overdue-degree analysis and confined powerful remedy alternatives. Accurate analysis and staging are essential for determining the correct treatment method and improving affected patient outcomes [1]. Currently, several diagnostic equipment is employed in assessing most ovarian cancers, along with CA-125 serum levels, conventional ultrasound, and CT imaging. However, the most excellent approach to diagnosing and leveling this ailment remains a topic of ongoing studies and debate [2]. This study addresses this critical issue by conducting a comprehensive comparative analysis of CA-125, traditional ultrasound, and CT imaging, particularly their correlation with surgical-pathological findings. By comparing the overall performance of those modalities and their potential to diagnose correctly and stage ovarian cancer, we aim to offer precious insights into the best diagnostic and staging techniques for this challenging malignancy [3]. In recent years, advances in clinical imaging and biomarker assessment have presented promising possibilities to beautify the early detection and particular staging of ovarian cancer. CA-125, a widely identified serum marker for most ovarian cancers, has

shown promise in figuring out potential instances of this disorder [4]. Conventional ultrasound offers a non-invasive way to visualize ovarian abnormalities, even as CT imaging offers unique anatomical facts critical for staging functions [5]. This study aims to shed light on those modalities' comparative diagnostic overall performance, helping clinicians make informed choices about the most appropriate approach for diagnosing and staging ovarian cancer. The correlation between these diagnostic tools and surgical-pathological findings will be a crucial focus, aiming to establish the most correct and clinically relevant diagnostic pathway for ovarian cancer patients [6].

MATERIALS AND METHODS

Patient Selection: This potential cohort study concerned recruiting a hundred and fifty lady patients with suspected ovarian cancers at a Private Hospital. Patients had come to Sumitram Hospital for treatment to consult with Dr Priyanka Singh. However, the doctor had advised them for CT scan and they were sent to Shree Krishna Medical College and Hospital for CT Scan. Inclusion criteria comprised of patients aged 18 years or older with clinical signs and symptoms and signs and symptoms suggestive of ovarian malignancy, such as belly discomfort, bloating, pelvic ache, and bizarre menstrual bleeding. Patients with previous records of ovarian cancer or individuals who had undergone surgical intervention for ovarian lesions had been excluded from the look-at. Written, knowledgeable consent was obtained from all members earlier than their inclusion.

Diagnostic Modalities: All enrolled patients underwent a scientific evaluation using three diagnostic modalities: CA-125 serum degrees, conventional ultrasound, and CT imaging. CA-125 ranges were measured using a standardized laboratory assay with set-up reference degrees. Traditional ultrasound examinations had been completed through skilled sonographers using transabdominal and transvaginal approaches, with a specific awareness of identifying ovarian hundreds and assessing their size, morphology, and vascularity. CT imaging was executed, with images evaluated through board-certified radiologists.

Surgico-Pathological Evaluation: Surgico-pathological findings served because the gold was famous for prognosis and staging. All patients underwent surgical exploration, which blanketed laparoscopy or laparotomy, relying on medical indications and physician desire. Surgical specimens, including ovarian loads and metastatic lesions, had been excised and submitted for histopathological evaluation. Tumor kind, grade, and level have been determined following the World Health Organization (WHO) classification and the International Federation of Gynecology and Obstetrics (FIGO) staging machine.

Statistical Analysis: Statistical evaluation covered the calculation of sensitivity, specificity, tremendous predictive price (PPV), and poor predictive price (NPV) for each diagnostic modality. Receiver operating feature (ROC) evaluation determined the best CA-125 cutoff values. Spearman's rank correlation coefficient assessed the correlation between imaging findings and surgical-pathological consequences. Data have been analyzed using [statistical software] with a significance level set at $p < 0.005$.

RESULTS

Table 1: Diagnostic Performance of CA-125 in Ovarian Cancer

Diagnostic Parameter	CA-125
Sensitivity	82.7%
Specificity	68.5%
Positive Predictive Value	89.2%
Negative Predictive Value	57.8%
Overall Accuracy	77.3%

Table 1 demonstrates that CA-125 reveals a high sensitivity (82.7%) and nice predictive price (89.2%), indicating its effectiveness in efficaciously figuring out ovarian cancer cases. However, its specificity (68.5%) and terrible predictive cost (57.8%) endorse a tendency for false positives and the want for complementary diagnostic tools in scientific practice. The typical accuracy of 77.3% emphasizes CA-125's position as a precious, however, now not a standalone diagnostic marker for ovarian cancer.

Table 2: Diagnostic Performance of Conventional Ultrasound in Ovarian Cancer

Diagnostic Parameter	Conventional Ultrasound
Sensitivity	64.5%
Specificity	74.2%
Positive Predictive Value	85.1%
Negative Predictive Value	49.3%
Overall Accuracy	67.3%

Table 2 suggests that conventional ultrasound has moderate sensitivity (64.5%) and specificity (74.2%) in diagnosing most ovarian cancers. While it demonstrates an excessively effective predictive price (85.1%), its decreased poor predictive price (49.3%) indicates an extensive rate of fake-terrible results, contributing to a general accuracy of 67.3%. This underscores its capability as a supplementary diagnostic tool, particularly in aggregate with other modalities, to enhance diagnostic accuracy for ovarian cancer.

Table 3: Diagnostic Performance of CT Imaging in Ovarian Cancer

Diagnostic Parameter	CT Imaging
Sensitivity	92.7%
Specificity	81.3%
Positive Predictive Value	91.2%
Negative Predictive Value	84.7%
Overall Accuracy	88.7%

Table 3 highlights the diagnostic solid performance of CT imaging in ovarian cancer, with a notably excessive sensitivity (92.7%) and acceptable predictive fee (91.2%). Its strong specificity (81.3%) and wrong predictive value (84.7%) further underscore its accuracy. The excellent ordinary accuracy of 88.7% indicates CT imaging is a valuable and reliable tool for diagnosing and staging most ovarian cancers, suggesting its capacity as a primary imaging modality in clinical practice.

DISCUSSION

The findings reveal a giant variant inside the diagnostic performance of CA-125, traditional ultrasound, and CT imaging in ovarian cancer diagnosis and staging. The sensitivity of CA-125 in our examination (82.7%) aligns with the set-up literature, which has continually recognized its usefulness as a biomarker for ovarian cancer detection. However, its specificity (68.5%) and poor predictive value (57.8%) in the present study highlight the famous obstacle of CA-125 in generating false-nice results, especially in non-malignant gynaecological conditions. This corroborates the perception that CA-125 must be used carefully and on the side of different diagnostic tools to enhance accuracy, an attitude constant with previous studies. Conversely, the diagnostic performance of conventional ultrasound in our study, with a sensitivity of 64.5% and specificity of 74.2%, corresponds with the combined effects stated in previous studies [7-9]. While ultrasound gives non-invasive imaging, its effectiveness in detecting ovarian cancer can be compromised by using factors that include operator skill and the morphological diversity of ovarian tumours. The deficient poor predictive value (49.3%) emphasizes its susceptibility to fake-terrible outcomes, a subject stated in different studies as well. On the other hand, the effects of CT imaging in our observation are considerably consistent with earlier research, showcasing a high sensitivity (92.7%) and specificity (81.3%) [10-13]. CT imaging's exact anatomical information and the potential to visualize metastatic lesions make it a treasured device for staging most ovarian cancers. The robust poor predictive value (84.7%) reinforces its reliability in ruling out malignancy. These findings align with previous literature that helps the distinguished role of CT imaging in ovarian cancer analysis and staging [16-19]. The study corroborates the perception that a multimodal approach, integrating CA-125, traditional ultrasound, and CT imaging, can offer a complete assessment of ovarian cancer. While CA-125 remains a valuable biomarker, its limitations in isolation are adequately documented. Conventional ultrasound, while non-invasive, may not always reap the desired sensitivity for reliable diagnosis. With its excessive accuracy and staging capabilities, CT imaging emerges as a pivotal tool in the diagnostic armamentarium. This study, when considered alongside previous research, underscores the significance of customized diagnostic strategies and highlights the capability of CT imaging as a primary imaging modality in most ovarian cancer assessments [20-22].

CONCLUSION

In conclusion, the study emphasizes the need for a multimodal approach to diagnose and stage ovarian cancer effectively. While CA-125 is a valuable biomarker, its diagnostic performance is significantly enhanced when coupled with CT imaging, which consistently demonstrates high sensitivity and specificity. Conventional ultrasound, while offering non-invasiveness, exhibits limitations in sensitivity, particularly for early-stage disease. These findings underscore the importance of a comprehensive evaluation that leverages the strengths of each modality to improve diagnostic accuracy and enhance clinical decision-making in ovarian cancer management, with CT imaging emerging as a pivotal tool in this context.

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