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ORIGINAL ARTICLE

Positron emission tomography in the management of documented or suspected recurrent ovarian cancer

Hung-Hsueh Chou [a,b,c,*,k], Chao-Yu Chen [c,d,e,k], Feng-Yuan Liu [b,c,f,k], Gigin Lin [b,c,g], Chun-Chieh Wang [b,c,h], Lan-Yan Yang [b,c,i], Min-Yu Chen [a,b,c], Yu-Bin Pan [i], Ren-Chin Wu [b,c,j], Tzu-Chen Yen [b,c,f], Ting-Chang Chang [a,b,c], Chyong-Huey Lai [a,b,c,*]

[a] *Department of Obstetrics and Gynaecology, Chang Gung Memorial Hospital Linkou Medical Centre, Taoyuan, Taiwan*
[b] *Chang Gung University College of Medicine, Taoyuan, Taiwan*
[c] *Gynaecologic Cancer Research Centre, Chang Gung Memorial Hospital, Taoyuan, Taiwan*
[d] *Department of Obstetrics and Gynaecology, Chiayi Chang Gung Memorial Hospital, Chiayi, Taiwan*
[e] *Chang Gung University College of Medicine, Chiayi, Taiwan*
[f] *Department of Nuclear Medicine, Chang Gung Memorial Hospital, Taoyuan, Taiwan*
[g] *Department of Medical Imaging and Intervention, Chang Gung Memorial Hospital, Taoyuan, Taiwan*
[h] *Department of Radiation Oncology, Chang Gung Memorial Hospital, Taoyuan, Taiwan*
[i] *Biostatistics Unit, Clinical Trial Centre, Chang Gung Memorial Hospital, Taoyuan, Taiwan*
[j] *Department of Pathology, Chang Gung Memorial Hospital, Taoyuan, Taiwan*

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KEYWORDS
computed tomography;
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Background: To prospectively evaluate the value of positron emission tomography (PET) or integrated computed tomography (CT) and PET (PET/CT) in the management of documented or suspected recurrent ovarian cancer.
Methods: Patients with ovarian cancer who had completed primary cytoreductive surgery and standard adjuvant chemotherapy were studied to evaluate the following indications: (1) CA125 elevation after complete remission with negative CT or magnetic resonance imaging (MRI) result; (2) post-therapy surveillance CT/MRI-detected suspicious lesions that guided biopsy was not feasible; (3) documented relapse for restaging prior to or after curative salvage

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* Corresponding authors. Chyong-Huey Lai, Department of Obstetrics and Gynaecology, Chang Gung Memorial Hospital at Linkou, 5 Fu-Shin Street, Kueishan, Taoyuan 333, Taiwan. Hung-Hsueh Chou, Department of Obstetrics and Gynaecology, Chang Gung Memorial Hospital at Linkou, 5 Fu-Shin Street, Kueishan, Taoyuan 333, Taiwan.
E-mail addresses: ma2012@cgmh.org.tw (H.-H. Chou), sh46erry@ms6.hinet.net (C.-H. Lai).
[k] H.-H. Chou, C.-Y. Chen, and F.-Y. Liu have equal contribution as first authors.

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therapy. The clinical impact of PET, as compared with those of CT/MRI, was determined on a per scan basis.
Results: From 2002 to 2009, 73 patients were recruited, and 92 PET scans were performed. Up to June 2015, 53 patients had died of disease, four were alive with disease, and the remaining 16 were alive without disease. Among the 92 scans, PET had positive impacts in 72.8%, no clinical impacts in 21.7%, and negative impacts in 5.4%. For indication 1, the sensitivity and positive predictive value of PET in detecting recurrence were 80.0% and 92.3%, respectively. For indication 2, the sensitivity, specificity, positive predictive value, and negative predictive value of PET were 91.2%, 62.5%, 91.2%, and 62.5%, respectively. For indication 3, PET provided positive impact in 85.3% and negative impact in 2.9% of the 34 scans.
Conclusion: PET has value in the management of suspected or documented recurrent ovarian cancer, with positive impacts on confirming recurrent status and offering a better treatment plan.

Introduction

Ovarian cancer is the seventh most common cancer worldwide for females, with nearly 239,000 new cases diagnosed in 2012.[1] The primary therapy for ovarian cancer consists of cytoreductive surgery followed by platinum-based chemotherapy. Although 75% of patients with ovarian cancer can achieve a complete response after primary therapy, about half of them will suffer recurrence and have a poor outcome.[2,3]

Most patients with recurrent ovarian cancer are not curable. Salvage treatment depends on the type and sites of recurrence. The median survival ranges from 12 to 24 months after recurrence and the primary goal of management is palliation.[2,4] There are many surveillance options after primary treatment.[5] Posttreatment surveillance every 2—4 months for 2 years, then every 4—6 months for 3 years, and then annually for 5 years is recommended by the National Comprehensive Cancer Network (NCCN) Guidelines. To detect recurrence, CA125 and radiographic surveillance is usually prescribed.[5] Computed tomography (CT) or magnetic resonance imaging (MRI) is also frequently utilized. CT has a limited sensitivity (SN) of 40—93% and specificity (SP) of 50—98% for recurrent disease. The SN of MRI in detecting recurrences is similar to that of CT in lesions larger than 2 cm; however, MRI is more useful in the detection of lesions on peritoneal surfaces and bowel serosa, the vaginal vault, *cul-de-sac*, and bladder base, or if patients cannot have a contrast-enhanced CT.[6]

Positron emission tomography (PET) using fluoro-2-deoxy-D-glucose (FDG) performs better than CT and MRI in the setting of suspected recurrence. In detecting recurrent ovarian cancer, FDG-PET had an SN of 85—97% and an SP of 90—100%, which were superior to those of CT. However, its negative predictive value (NPV) is low (42.9%) because of the high rate of false-negative (FN) findings for microscopic or cystic lesions.[7] Clinical experience shows that PET aids in planning of salvage surgery by identifying those patients with unresectable disease and by modifying the treatment plan.[8] PET is classified as Category 2B recommendation (i.e., NCCN consensus) as the evidence is still based on retrospective studies.[6,9]

Our aim for conducting this prospective study was to evaluate the value of PET or PET/CT (designated as PET thereafter) in the management of suspected or documented recurrent ovarian cancer.

Patients and methods

Patient and study design

This study was approved by the Institutional Review Board of the Chang Gung Memorial Hospital, Taoyuan, Taiwan, and informed consent was obtained from each enrolled patient. Patients with suspected or documented recurrent epithelial ovarian cancer were eligible if they met one of the following criteria: (1) CA125 elevation (doubling of CA125 with at least one of the value >35 U/mL or two measurements of CA125 values >35 U/mL checked at least 2 weeks apart[10]) after complete remission with negative CT or MRI (CT/MRI); (2) post-therapy surveillance CT/MRI detected suspicious lesions that guided biopsy was not feasible; (3) documented relapse or restaging prior to or after curative salvage therapy [secondary cytoreductive surgery, radiotherapy (RT), concurrent chemoradiation, or ablation by radiofrequency].

The exclusion criteria included: (1) patients who underwent a curative-intended treatment deemed not appropriate; (2) patients with a concomitant or a history of malignancy; (3) patients who were not suitable for receiving a PET study for technical or psychological reasons; or (4) patients who were judged as noncompliant with treatment.

Every enrolled patient was discussed at a weekly joint conference attended by gynecological oncologists, radiation oncologists, radiologists, pathologists, and nuclear medicine physicians. The patients underwent treatment according to the decision of the joint conference. Prior to undergoing PET scanning, each patient completed an abdominal and pelvic CT/MRI scan, and the eligible patients received a PET scan within 2 weeks after the CT/MRI. In addition to a CT/MRI scan, a follow-up PET scan was

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