Research Article

Modified Gatot Score has a better Specificity in Predicting Ovarian Malignancies Compared to Risk Malignancy Index

Modifikasi Skor Gatot Memberikan Spesifisitas yang lebih Baik dibandingkan Risk Malignancy Index

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Abstract

Objective: The study was designed to evaluate the sensitivity and specificity of several methods in detecting ovarian epithelial malignancy by comparing Gatot Score and Risk Malignancy Index, and also proposing the modification of Gatot Score.

Methods: Four hundred and one subjects with suspected epithelial ovarian malignancy were subjected to the study and had anamnesis, physical examinations, laboratories studies and ultrasonography performed. From the data, we took the variables according to Gatot Score and Risk Malignancy Index. We performed statistic analysis in term of sensitivity, specificity, ROC and optimal cut-off-point.

Result: From 401 observation subjects, revealed that Gatot Score possess the sensitivity of 73.7% and specificity of 45.6% (p = 0.000; LR 28.830), while RMI possess the sensitivity of 72.4% and specificity of 35.94% (p = 0.02, LR 9.588) for RMI 1, and the sensitivity of 76% and specificity of 30.9% (p = 0.05; LR 7.984) for RMI 2. Modification to Gatot Score was performed by re-weighting to its all variables, which resulted in Gatot Score Modification 1 with cut-off point of 28.5, sensitivity of 60.4% and specificity of 35.94% (p= 0.000, LR 44.228) and Gatot Score Modification 2 with cut-off point of 5.75, sensitivity range between 49.3-69.6% and specificity range between 51.6-65.2% (p = 0.000; LR 36.806).

Conclusion: Both Gatot Score and RMI gave unsatisfactory output in predicting the malignancy of ovary. By reassigning the weighting of all variables in Gatot Score, the sensitivity and especially the specificity was improved in detecting the malignancy of epithelial type ovary. This measure was directed for patients in reproductive ages, thus increasing the possibility of true malignancy.

[Indones J Obstet Gynecol 2013; 37-2: 113-6]

Keywords: Ca-125, epithelial ovary tumor, Gatot score, risk malignancy index

Abstrak

***Tujuan**: Penelitian ini ditujukan untuk mengevaluasi sensitivitas dan spesifisitas dari beberapa metode penapisan keganasan pada tumor ovarium jenis epitelial dengan membandingkan Skor Gatot dan Risk Malignancy Index, serta mengajukan modifikasi Skor Gatot.*

***Metode**: Empat ratus satu pasien dengan kecurigaan keganasan ovarium tipe epithelial dimasukkan sebagai subjek penelitian, dilakukan prosedur anamnesis, pemeriksaan fisik, laboratoris dan ultrasonografi. Dari data tersebut, diambil variabel-variabel yang sesuai dengan Skor Gatot dan Risk Malignancy Index. Dilakukan analisa statistik berupa perhitungan sensitivitas dan spesifisitas serta ROC dan titik potong optimal.*

***Hasil**: Dari 401 subjek penelitian, didapatkan bahwa Skor Gatot memiliki sensitivitas 73,7% dan spesifitas 45,6% (p = 0,000; LR 28,830) sedangkan RMI memiliki nilai sensitivitas 72,4%, spesifisitas 35,94% (p = 0,02, LR 9,588) untuk RMI 1 dan nilai sensitivitas 76%, spesifisitas 30,9% (p = 0,05; LR 7,984) untuk RMI 2. Dilakukan modifikasi pada Skor Gatot dengan pembobotan ulang pada tiap variabel, didapatkan hasil Modifikasi Skor Gatot 1 memiliki titik potong pada nilai 28,5 dengan sensitivitas sebesar 60,4% dan spesifisitas sebesar 35,94% (p= 0,000, LR 44,228) dan Modifikasi Skor Gatot 2 memiliki nilai potong pada titik 5,75 dengan kisaran nilai sensitivitas 49,3-69,6% dan spesifisitas 51,6-65,2% (p = 0,000; LR 36,806).*

***Kesimpulan**: Skor Gatot dan RMI memberikan hasil yang kurang memuaskan dalam melakukan prediksi keganasan ovarium. Dengan melakukan pembobotan ulang pada tiap variabel pada Skor Gatot, sensitivitas dan terutama spesifisitas dapat ditingkatkan dalam mendeteksi adanya keganasan ovarium tipe epitelial. Hal ini ditujukan agar dapat meningkatkan prediksi keganasan pada pasien dalam usia reproduksi.*

[Maj Obstet Ginekol Indones 2013; 37-1: 113-6]

***Kata kunci**: Ca-125, risk malignancy index, skor Gatot, tumor ovarium tipe epitelial*

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INTRODUCTION

Ovarian cancer is the third most common gynecology malignancy in the world and its mortality rate is high.[1] Bad prognosis correlate with late diagnosis or screening, thus 70% of the patients were diagnosed at late stage.[2] Overall survival rate for ovarian cancer is only around 30.6%.[3] Research for screening or diagnosing ovarian cancer (especially epithelial type, the most common) is needed.

In Indonesia, according to WHO data in 2004, ovarian cancer prevalence reached 7.0% from the total population and increased by time.[4] This condition occurred due to there is no precancer lesion in ovarian malignancy pathogenesis, such as in cervical cancer.[5,6]

Diagnosis was developed using clinical symptoms - mostly asymptomatic at the early stage, physical examination, surgery, and histology examination.[7] Preoperative diagnosis is important to determine which patient should undergo oncologic surgery or which one that can be handled by general obstetric-gynecologist.[8,9]

Gatot, 1996, tried to develop a scoring system for epithelial ovarian malignancy that can differentiate malignant lesion from the benign lesion. His research recruited 133 patients with epithelial ovarian cancer. Using characteristic of ovarian malignancy, such as body weight loss, Doppler resistance index, solid part from ultrasonography examination, ascites and Ca-125, he developed Gatot score. This scoring system gave sensitivity 96% and specificity 97% for total score of 10.[3]

Other scoring system to predict the ovarian malignancy is risk malignancy index (RMI), a worldwide known scoring system, which introduced by Jacobs in 1990 and being revised twice by Tingulstad in 1996 and Jacobs in 1999. RMI used three indicators; ultrasonography findings, menopause state, and Ca-125 level. The cut off point of the RMI is 200 with sensitivity of 73% and specificity 86%.[8]

Remembering the high mortality rate and incidence of ovarian malignancy, it is considered important to study the sensitivity and specificity of Gatot score - or modification of it, and RMI in predicting ovarian cancer in Indonesia population.

METHODS

This study is designed as cross sectional study, using the patients' medical records in Dr. Cipto Mangunkusumo Hospital. We included patients who was initially diagnosed as cystic ovarian neoplasm and underwent operation and pathological examination, dated from 2005 to 2010. There were 322 subjects that were suitable for inclusion criteria and had complete medical records for each variable of the scoring system.

The inclusion criteria were patients having cystic ovarian neoplasm (not solid), with complete data of ultrasonography (resistance index, characteristic of tumor, ascites), Ca-125 levels and menopause state, who underwent surgery in Dr. Cipto Mangunkusumo Hospital, and whose histopathology result showed epithelial tumor or others such as endometriosis, but not other types (germ-cell tumor, sex-cord tumor, etc). Exclusion criteria were the advanced stage of ovarian cancer (stage III or higher), complication of other malignancy, and the presence of distant metastasis.

Each subject was being calculated using Gatot score and RMI to predict the presence of malignancy, then the histopathology result were compared. Using SPSS v11.5, the sensitivity and specificity of both Gatot score and RMI was tested. We also tried to make a modification of Gatot score for better prediction result. The ROC of each scoring system was calculated.

The formula of Gatot score is the presence of ascites, solid part in the tumor, resistance index below 0.4, body weight below ideal body weight, and Ca-125 above 35 U/ml (each presence value 2, if none value 0). The total score of Gatot score is 10.

The formula of RMI is the multiplication of the ultrasonography value (value 1 or 3) with menopause value (score 1 if premenopause, score 3 for menopause) and value of Ca-125 levels (in U/ml). If the RMI is above 200, then the possibility of malignancy is high.

RESULT

Table 1. Characteristics of Ovarian Cancer in Subjects.

Characteristics	Frequency	Percent (%)
Type :		
• benign	122	37.9
• borderline	76	23.6
• I	96	29.8
• II	28	8.7
Histopathology :		
• Endometriosis	31	9.6
• Mucinous cystadenoma	82	25.5
• Serous cystadenoma	8	2.5
• Seromucinous cystadenoma	29	9.0
• Mucinous cystadenocarcinoma	32	9.9
• Serous cystadenocarcinoma	36	11.2
• Seromucinous cystadenocarcinoma	3	0.9
• Clear cell carcinoma	23	7.1
• Others	78	24.3
Menopause state :		
• Premenopausal	243	75.5
• Postmenopausal	79	24.5
Ca-125 :		
• < 35 U/ml	91	28.3
• > 35 U/ml	231	71.7
Ultrasonography score for RMI :		
• 1	51	15.8
• 3	271	84.2

Table 2. The Sensitivtity and Specificity of Gatot Score, Modified Gatot Score, RMI 1 and RMI 2.

Scoring methods	ROC/AUC	Cut off point	Sensitivity (%)	Spesificity (%)	McNemar (p) Kappa (R)
Gatot score	0.626	5	71.05	60.87	p = 0.000
					R = 0.158
RMI 1, Jacobs	0.553	200	68.12	56.52	p = 0.000
					R = 0.099
RMI 2, Tingulstad	0.537	200	71.01	48.55	p = 0.000
					R = 0.069
Gatot Score without BW < IBW category	0.634	5	60.87	78.99	p = 0.000
					R = 0133
Gatot Score Modification	0.651	7	90.57	41.30	p = 0.000
					R = 0.195

The youngest age of the subject was 14 years old and the oldest was 88 years old, with the mean age of subjects was 46 years old. The subjects mostly worked as housewives (82.1%) and finished their high school education (77.56%). Characteristics of ovarian cancer are showed in Table 1.

From data analysis, we found unsatisfactory result using Gatot score and RMI in predicting ovarian malignancy. Gatot score only gave 71.05% of sensitivity and 60.87% of specificity. RMI also gave similar results (see Table 2).

To enhance the predictive value of Gatot score, we tried to do modification of Gatot score. We re-weightened each of Gatot score's variables and got new formula. From our statistical analysis, the body weight variable in Gatot score had less influence in predicting malignancy. Its exsistence only gave additional value of 0.79% to the predictive value accuracy. Thus, this variable was dropped. Ascites re-weighted to score 2, solid part score 7, resistance index score 2, and Ca-125 > 35U/ml score 2. Total score of this modification version is 13. Using this modification, the probability of predicting ovarian cancer increased to 91.68%. Analysis from ROC curve, Gatot modification gave higher value of AUC and its sensitivity reached 90.57% and specificity of 41.30% at cut off point 7.

The original Gatot score was unable to give better prediction than RMI even though Gatot score was developed using Indonesia patients' characteristics, because the subjects with clinically advanced stage ovarian cancer were still included.

By excluding the stage III or clinically advanced stage ovarian cancer patients, the modification of Gatot score could give better prediction.

CONCLUSION

In practice, it is really important to differentiate the malignant from benign lesions, because the management is different. Using scoring system, patients with suspicious epithelial ovarian cancer could be filtered using modification of Gatot score, so the prediction of malignancy lesions could be enhanced. With this scoring, we could determine who would become the operator, a general obstetric gynecologist or an oncology gynecologist.

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