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Assessment of Wells Criteria in Patients with Pulmonary Embolism

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ABSTRACT

***Background**: Pulmonary embolism (PE) is one of the most important emergencies in internal medicine. Wells criteria are used to predict the presence of pulmonary embolism on the basis of clinical manifestations. The aim of this study was to assess Wells criteria in patients with pulmonary embolism.*

***Materials and Methods**: Ninety-nine patients with the diagnosis of PE underwent anticoagulant therapy during 2002-2006. Data were collected using a questionnaire and then analyzed by using SPSS software.*

***Results:** The most common symptoms were dyspnea (70.7%) and chest pain (60.6%). Wells criteria included "an alternative diagnosis less likely than PE" (84%), hemoptysis (34%), leg pain or swelling (30%), tachycardia (29%), recent surgery or immobilization (27%), previous deep vein thrombosis (22%) and malignancy (2%). Eight percent, 69% and 23% of patients had Wells scores less than 2 points, 2-6 and >6 points, respectively. Among the patient group with modified Wells criteria, 36 patients (36.4%) had scores <4 points and 63 (63.6%) had scores greater than 4 points.*

Conclusion**: The majority of patients with PE had Wells score of 2-6 points and those patients with Wells score less than 4 had a positive CT-angiogram.* ***(Tanaffos 2008; 7(2): 50-53)

***Key words**: Pulmonary embolism, Wells criteria, Deep vein thrombosis*

INTRODUCTION

Pulmonary embolism (PE) is one of the most important emergencies in internal medicine. The incidence of PE in the United States is estimated to be 6,000,000 cases per year; it results in 50,000-200,000 deaths annually. Its high prevalence and mortality rate results from difficulty in making the diagnosis (3,4). Clinical manifestations and laboratory findings for PE are nonspecific and chest x-ray is usually normal (5). Since the gold standard method for diagnosis of PE is angiography which is an expensive and invasive procedure and is not available in many centers, clinical and para-clinical findings are used to make a definite diagnosis (6). Selection of clinical criteria is varied and may have different sensitivity and specificity. Wells criteria are

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used for diagnosis of PE (7). The purpose of this study was to assess Wells criteria in patients with pulmonary embolism.

MATERIALS AND METHODS

Ninety-nine patients diagnosed with pulmonary embolism underwent anticoagulant therapy during 2002-2006. The questionnaire consisted of demographic data such as age, sex, electrocardiographic (ECG) changes, echo-cariographic changes and Wells criteria included:

1. Signs and symptoms of deep vein thrombosis (3 points)
2. An alternative diagnosis less likely than PE (3 points)
3. Heart rate (PR)>100 beats/min (1.5 points)
4. Recent surgery in the past 4 weeks (1.5 points)
5. Previous deep vein thrombosis (DVT) or PE (1.5 points)
6. Malignancy during the past six months (1 point) and
7. Hemoptysis (1 point).

Modified Wells score <4 and >4 were included in low probability and high probability groups, respectively. Low probability, moderate/intermediate probability and high probability were related to Wells score <2, 2-6 and >6 points, respectively. Definite diagnosis of PE was through computed tomography (CT) and angiography which was done in all patients.

RESULTS

Among 99 study patients, 30 (30.3%) were females and 69 (69.7%) were males. Seventy-six patients (76.8%) were >40 yrs and 23 (23.2%) were <40 yrs.

Table 1 shows clinical and paraclinical findings of patients with a definite diagnosis of pulmonary embolism.

Table 1. Clinical manifestations and paraclinical findings in patients with definite diagnosis of pulmonary embolism.

Clinical and paraclinical findings	Yes No. (%)	No No. (%)	Missing No. (%)
Dyspnea	70 (70.7)	28 (28.3)	(1) 1
Chest pain	60 (60.6)	39 (39.4)	0
Cough	31 (31.3)	68 (68.7)	0
Cigarette smoking	45 (45.5)	51 (51.5)	(3) 3
Syncope or hypotension	11 (11.1)	87 (87.9)	(1) 1
ECG	21 (21.2)	75 (75.8)	(3) 3
$S_1Q_3T_3$	7 (7.1)	89 (89.9)	(3) 3
InvertedT in V_1-V_4	14 (14.1)	82 (82.9)	(3) 3
D-Dimer	31 (31.3)	9 (9.1)	(59.6) 59
Echocardiography	35 (35.4)	48 (48.5)	(16.1) 16
Perfusion scan	14 (14.2)	2 (2)	(83.8) 83
Doppler sonography	35 (35.4)	41 (41.1)	(23.2) 23
Death	12 (12.1)	87 (87.9)	0

Wells criteria are shown in Table 2.

Among patients with a definite diagnosis of PE, 8 (8.1%), 68 (68.7%) and 23 (23.2%) cases had Wells scores <2, 2-6 and >6, respectively. Moreover, 36 (36.4%) and 63 (63.6%) patients with Wells scores less than 4 points and >4, respectively, were classified in the modified Wells criteria group.

Table 2. Wells criteria in 99 patients with definite diagnosis of pulmonary embolism.

Wells criteria in patients with positive CT-angiograms	Yes No. (%)	No No. (%)	Missing No. (%)
Leg pain or swelling	30 (30.3)	69 (69.7)	0
Alternative diagnosis less likely than PE	84 (84.8)	15 (15.2)	0
Recent surgery or immobilization in previous 4 wks	27 (27.3)	72 (72.7)	0
Pervious DVT*	22 (22.2)	77 (77.8)	0
Tachycardia	29 (29.3)	70 (70.7)	0
Malignancy	2 (2)	97 (98)	0
Hemoptysis	34 (34.3)	65 (65.7)	0

*DVT: deep vein thrombosis

DISCUSSION

There was no significant difference in age and sex between our under-study population and those of other studies. Moreover, dyspnea, chest pain, cough and hemoptysis were detected in 70.7%, 60.6%, 31.3% and 34.3% of our patients, respectively. There was no significant difference between our results and those of other studies (84%, 74%, 53% and 30% respectively) ($p>0.05$) (8, 9).

Echocardiographic changes such as right ventricular enlargement, pulmonary artery hypertension, tricuspid regurgitation and right ventricular dysfunction were detected in 35% of cases vs. 40-70% in other studies (10, 11). In assessment of Wells criteria with CT-scan showing pulmonary embolism, the highest score belonged to "an alternative diagnosis less likely than PE" by various physicians. This may highly influence the calculation of Wells criteria and may be a drawback for this scoring system (9). Since 68% of patients with definite diagnosis of pulmonary embolism had Wells scores between 2 and 6 points, it was necessary to perform paraclinical evaluations especially CT-angiography or ventilation-perfusion scan for these patients. On the other hand, patients with Wells score >6 (high probability group) had PE in 90% of the cases, indicating the higher Wells scores and higher incidence of PE which has also been confirmed in other studies (9, 12).

Further studies are required for evaluation of other predisposing factors of PE (i.e. advanced age, obesity, cigarette smoking, consumption of oral contraceptives, congestive heart failure, chronic obstructive pulmonary disease, hypertension, pregnancy, etc.) which are not evaluated in Wells criteria.

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