Original Article

Disseminated Intravascular Coagulation in Ramathibodi Hospital

Piyanut Mahanupap[1], Pantep Angchaisuksiri[1] and Sasivimol Rattanasiri[2]

Division of Hematology, Department of Medicine[1], Clinical Epidemiology Unit[2], Ramathibodi Hospital, Mahidol University, Bangkok.

Abstract : Background : *Disseminated intravascular coagulation (DIC) is an acquired syndrome characterized by systemic activation of blood coagulation leading to widespread deposition of fibrin in the microcirculation and can contribute to multiple organ failure. Depletion of platelets and coagulation factors in blood may cause bleeding. Patients with DIC are at high risk for mortality.* ***Objectives :*** *To study the overall survival and mortality rate of DIC patients and to analyze factors that were related to the overall survival and mortality of these patients.* ***Method :*** *Between January 2001 and December 2008, all adult patients admitted to Ramathibodi Hospital who were diagnosed with DIC were analyzed. The diagnosis of DIC was made according to the criteria proposed in 2001 by the International Society on Thrombosis and Haemostasis.* ***Results :*** *One hundred sixty-five patients with DIC were analyzed. One hundred eighteen cases had overt DIC and 47 cases non-overt DIC. Fifty-four percent were male and 46% female. The median age was 61.5 years. The most common etiology of DIC was sepsis, followed by malignancy. The most common manifestation of DIC was bleeding. The mortality rate was 75% in overt DIC patients and 57% in non-overt DIC patients. Overt DIC patients had significantly shorter median survival than non-overt DIC patients (8 days vs. 28 days, p=0.01). By multivariate analysis, prognostic factors affecting survival were shock (HR 2.39; 95%CI, 1.64-3.51) and acute renal failure (HR 1.82; 95%CI, 1.30-2.56).* ***Conclusions :*** *The mortality rate of patients with DIC was high. It might be useful to establish a standard guideline for early diagnosis and treatment of DIC. Further study to see if restoration of coagulation and physiological anticoagulant pathways will improve the prognosis of patients with DIC is warranted.*

Key Words : ● *Disseminated intravascular coagulation* ● *DIC*

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Introduction

Disseminated intravascular coagulation (DIC) is not a disease nor symptom but a syndrome, which is secondary to an underlying disorder. It is characterized by systemic activation of blood coagulation leading to widespread deposition of fibrin in microcirculation, and can contribute to multiple organ failure. Depletion of platelets and coagulation factors in blood may cause bleeding. Conditions associated with DIC are infection (in particular septicemia), trauma, malignancy, obstetrical calamities, severe hepatic failure, and severe toxic or immunological reaction[1]. The clinical manifestations of DIC are bleeding, thrombosis, or both and often result in dysfunction of one or more organs. Since no single laboratory test is sensitive or specific enough to allow a definite diagnosis of DIC, the subcommittee of the International Society on Thrombosis and Haemostasis (ISTH) proposed a scoring system for overt and non-overt DIC in 2001 (Figure 1)[2]. A prospective validation study

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Requests for reprints should be addressed to Pantep Angchaisuksiri M.D., Division of Hematology, Department of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok 10400, Thailand. Email: rapac@mahidol.ac.th

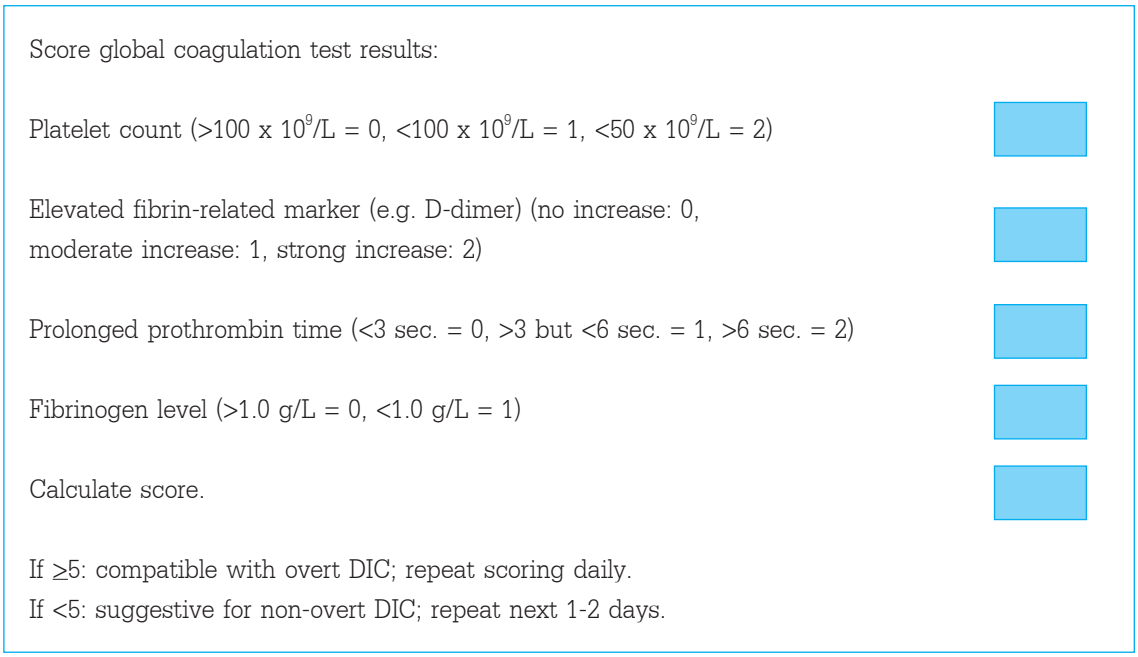

Figure 1. Scoring system for the diagnosis of disseminated intravascular coagulation (DIC).[2]

of this scoring system demonstrated that assessment of overt DIC had a high accuracy for making or rejecting a diagnosis of DIC when compared with the "gold standard" of expert opinion[3]. It has also been reported that the ISTH overt DIC scoring system is useful for identifying patients with a high risk of death[4,5].

The purposes of this study were to explore factors that caused DIC, prognostic factors related to mortality, clinical course and outcomes from different underlying disorders, and to analyze laboratory tests related to diagnosis and prognosis of DIC.

Material and Methods

This study was a retrospective study of DIC patients diagnosed by ICD10 code 'D65' on discharge from January 2001 to December 2008. Patient's name and hospital number were first searched from the hospital database. Chart review was performed later from January 2007. DIC was diagnosed by ward clinicians. This study obtained document proof of ethical clearance from the committee on human rights related to research involving human subjects from the Faculty of Medicine, Ramathibodi Hospital.

Selection criteria

Two hundred forty-seven patients diagnosed with DIC in Ramathibodi Hospital were recruited for the study. All patients were over 15 years of age and were admitted to the hospital. Exclusion criteria were 1) incomplete history on admission, 2) no laboratory test on admission.

Diagnosis and cause of DIC

Patients initially diagnosed with DIC were reviewed and re-diagnosed for DIC by using the ISTH scoring system. The causes of DIC on admission were re-investigated. DIC was confirmed by laboratory tests. A 'DIC panel' test consisting of complete blood count, coagulogram, fibrinogen level, D-dimer, and euglobulin lysis time was used for diagnosis and follow-up of DIC. We divided DIC patients into two groups depending on DIC scoring system as shown in Figure 1.

Data collection

DIC patients' charts were reviewed from the admission date until discharge or death. DIC start time was defined by the cause of DIC and duration of DIC was calculated from this time. DIC ended when patient's laboratory

tests returned to normal along with the resolution of the cause of DIC. For dead patients, DIC ended at the time they died. Patients were separated by medical problems, underlying diseases, and associated organ failures. Patient's clinical manifestations of DIC were defined as bleeding or thrombosis. Treatments of DIC were different for each patient depending on clinical manifestations, patient's conditions, and laboratory results. DIC treatments included blood transfusion, anticoagulant, vitamin K, tranexamic acid, and recombinant activated factor VII.

Laboratory tests monitoring started from admission to the emergency room or to the hospital wards until patients were discharged or died. Computer data collection from the hospital database was used if the reviewed charts were not complete. The complete blood count, prothrombin time, fibrinogen level, and D-dimer level were measured by standard laboratory techniques. The 'DIC panel' test included all of above laboratory tests with the addition of euglobulin lysis time. If patients did not fulfill all laboratory tests by the ISTH DIC criteria, they were excluded from the data analysis.

Statistical analysis

Patients were included in the analysis if they had underlying causes of DIC and had fulfilled all laboratory tests for DIC. Date of DIC started from the date of DIC diagnosis until resolution or death. Patient characteristics were compared by chi-square test or Fisher exact test. Survival curves or prognostic factors were estimated by the Kaplan-Meier method and compared with the use of the log-rank test. For all analyses, $p<0.05$ was considered statistical significance.

Results

From January 2001 to December 2008, the number of patients diagnosed with DIC increased every year (Figure 2). 165 patients had fulfilled laboratory tests of DIC. Data analysis was based on this patient group.

Patient's characteristics

Basic characteristics of 165 patients with DIC are shown in Table 1. Fifty-four percent were male (n=89) and 46% female (n=76). The median age was 61.5 years. Patient's status at discharge was dead 70% (n=115) and alive 30% (n=50). For living patients, 39 cases were followed up at Ramathibodi Hospital.

Etiology of DIC

The major causes for DIC in the 165 patients are

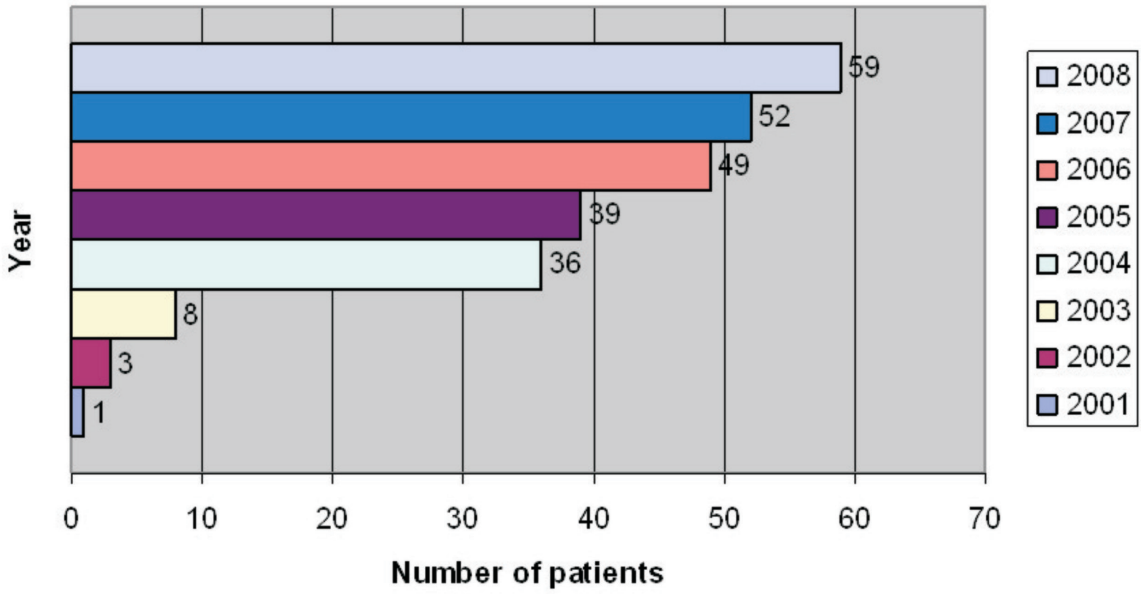

Figure 2. Number of patients diagnosed with DIC from January 2001 to December 2008.

Table 1. Basic characteristics of DIC patients in Ramathibodi Hospital.

Basic characteristics	All patients with DIC (n=165)	Patients with overt DIC (n=118)	Patients with non-overt DIC (n=47)
Sex :			
Male	89 (54%)	67 (57%)	22 (47%)
Female	76 (46%)	51 (43%)	25 (53%)
Age (year)	61.5 ± 16.9	59.7 ± 16.8	61.7 ± 17.1
Ward admission			
ICU	109 (66%)	80 (68%)	29 (62%)
Non-ICU	56 (34%)	38 (32%)	16 (38%)
Status of discharge			
Dead	115 (70%)	88 (75%)	27 (57%)
Alive	50 (30%)	30 (25%)	20 (53%)

Table 2. Etiology of DIC.

Underlying conditions	All patients with DIC (n=165)	Patients with overt DIC (n=118)	Patients with non-overt DIC (n=47)
Sepsis/severe infection	123 (74%)	90 (76%)	33 (70%)
Malignancy	18 (12%)	10 (8.4%)	8 (17%)
Trauma	2 (1%)	1 (0.9%)	1 (2%)
Perioperative complication	5 (3%)	5 (4.2%)	-
Acute myecardial infarction	1 (0.6%)	1 (0.9%)	-
Liver failure	1 (0.6%)	1 (0.9%)	-
Aortic aneurysm	2 (1%)	1 (0.9%)	1 (2%)
Others	13 (7.8%)	9 (7.8%)	4 (9%)

summarized in Table 2. Severe infection or sepsis was the most frequent cause of DIC (n=123, 74%). In 75 cases, microorganisms were isolated from blood or body fluids. The microorganisms identified were gram-negative bacteria in 50 patients (67%), gram-positive bacteria in 15 patients (20%), other microorganisms in 10 patients (13%) including Aspergillosis in 2 cases, Tuberculosis in 2 cases, Candidiasis in 2 cases, Pneumococcus, Nocardiasis, Cryptococcosis, Toxoplasmosis in 1 case each. In 48 cases, severe infection was diagnosed clinically but cultures were negative presumably because they were taken after antibiotic treatment. The most frequent site for severe infection was pneumonia (43 cases). Also most patients were admitted to the ICU and required respirator support. Urinary tract infection and gastrointestinal tract infection were the second and third common infection in severe infection patients (19 and 12 cases, respectively).

Malignancy was the second common cause of DIC in Ramathibodi Hospital. There were 15 cases of non-hematologic malignancy and 3 cases of hematologic malignancy. For hematologic malignancy, two cases were acute promyelocytic leukemia and one was lymphoma. One case of acute promyelocytic leukemia developed subdural hematoma, the other had no sign of bleeding. For non-hematologic malignancy, most cases were prostate cancer (n=5) followed by gastric carcinoma (n=2). Other non-hematologic malignancy

were hepatocellular carcinoma, cancer of cervix, cancer of uterus, intrahepatic bile duct carcinoma, lung cancer, nasopharyngeal cancer, and pyriform sinus carcinoma in one case each.

There were only 2 patients with trauma. The signs of DIC developed shortly after their admission. Both cases were related to car accidents, one with fracture acetabulum and frail chest, the other with opened fracture of extremities. The first case had intraoperative bleeding and postoperative bleeding. The other case had no sign of bleeding.

Perioperative complications were seen in 5 cases. All cases were surgical conditions of gastrointestinal surgery i.e. gastric ulcer bleeding, gastric perforation, perforated diverticulum, appendicitis with peritoneal abscess and gut obstruction. All 5 patients had successful surgery but there were intraoperative and postoperative complications and bleeding.

Other etiologies were aortic aneurysm in two cases and one case each of liver failure, acute myocardial infarction with cardiogenic shock, anaphylactic shock, arsenic poisoning with severe respiratory distress, bowel ileus with intraabdominal infection, congestive heart failure with shock, hemophagocytosis with febrile neutropenia, Kasabach-Merritt syndrome, fever of unknown origin with unexplained shock, pheochromocytoma with hospital acquired pneumonia, rupture liver nodule, snake bite, third degree burn, and upper gastrointestinal tract bleeding.

Clinical manifestations and co-morbidity

Bleeding was the most frequent clinical manifestation in DIC patients. Bleeding related DIC was observed in 46% of all cases. The sites of bleeding and their frequency are shown in Table 3. The most common bleeding site was the gastrointestinal tract (n=51). Some patients had bleeding at more than one site. Patients with bleeding at more than one site had overt clinical symptoms and the worst prognosis. Patients with sepsis manifested bleeding more than other groups.

Seven patients had overt manifestations of thrombo-embolism which appeared to be related to DIC. These manifestations involved both arterial and venous sites which were occlusion of superior mesenteric artery, inferior vena cava thrombosis, arterial occlusion of big toe, pulmonary embolism, hemodialysis catheter thrombosis, and deep vein thrombosis. This complication occurred in some patients with sepsis. There was no patient who presented with both thrombosis and bleeding.

Sepsis patients had more co-morbidities than patients with malignancy or trauma. These might contribute to

Table 3. Sites of bleeding and thrombosis in DIC patients.

Clinical manifestations	DIC patients (n=165)
Bleeding	76 (46%)
Gastrointestinal bleeding	51
Endotracheal tube bleeding	6
Post-operative bleeding	8
Hematuria	5
Skin (ecchymosis)	2
Hematoma	3
Subdural hematoma	4
Subarachnoid hemorrhage	1
Intracerebral hemorrhage	1
Vaginal bleeding	4
Oral mucosa and gingival	3
Thrombosis	7 (4%)
Arterial site	5
Venous site	2

the worse prognosis of sepsis patients than other groups. ICU patients had more than one co-morbidities which required more interventions. This patient group also had worse prognosis. Shock and respiratory failure were commonly found in DIC patients (66% and 74%, respectively). These conditions were indication for admission to the ICU from the emergency room. Acute renal failure frequently occurred in DIC patients (58%). More than 50% of acute renal failure cases required hemodialysis. Chronic renal failure was found in 15 cases (9%). All of these cases had acute renal failure on top when they developed DIC. Among patients with sepsis and DIC, 10 patients had hematologic malignancy and 36 patients had non-hematologic malignancy. Neutropenia was seen in 9 out of 10 cases with hematologic malignancy.

Treatment

Blood transfusion was a common treatment in DIC patients. Blood components were used in 146 cases (88%). The mean number of blood component use was as follows: packed red cell 6.25 units (range 0-40), fresh frozen plasma 9.5 units (range 0-114), cryoprecipitate 23.0 units (range 0-450), random platelet concentrates 11.8 units (range 0-92), single donor platelet concentrates 1.6 units (range 0-46). Endotracheal tube insertion was performed in 123 cases (74%) and inotropic drugs were used in 110 cases (67%). Tranexamic acid was used in 16 cases (10%). Vitamin K was used in 81 cases (49%) with prolonged prothrombin time. The dose and duration of tranexamic acid and vitamin K use varied depending on clinician's decisions. Recombinant activated factor VII was used in 7 cases. The indications were perioperative bleeding in 5 cases, multiorgan bleeding in ICU in 1 case and endotracheal tube bleeding with pulmonary hemorrhage in 1 case. The total dose ranged from 3,600 μg to 18,000 μg. Repeated dose were used in 2 cases (one twice, the other 3 times). Warfarin was successfully used in 2 patients with Kasabach-Merritt syndrome. Low-molecular weight heparins were used in 8 cases. The indications were abdominal aortic aneurysm in 2 cases, prostate cancer with bone metastasis in 2 cases, venous thromboembolism in 2 cases, myocardial infarction in 1 case, and limb gangene in 1 case.

Laboratory tests

Laboratory tests were done in the emergency room at first presentation. Basic laboratory tests were complete blood count and coagulogram. In some cases, clinicians would check fibrinogen and D-dimer. Clinical manifestation and abnormal basic laboratory test results influenced clinicians' decisions on additional tests. From the patients' clinical manifestations and abnormal basic laboratory test results, the diagnosis of DIC was made. Laboratory tests in patients with DIC are shown in Table 4.

Overt and non-overt DIC

The ISTH DIC scoring system was used in 165 cases that had fulfilled laboratory tests. Patients were divided by DIC score as shown in Figure 3. Overt DIC was diagnosed in patients with a DIC score of 5 or more, whereas non-overt DIC was diagnosed in patients with DIC score less than 5. There were 118 cases of overt DIC and 47 cases of non-overt. There was no statistical significant difference in the basic characteristics, etiology of DIC, co-morbidity and treatment between overt DIC and non-overt DIC groups.

Mortality and survival analysis

The mortality rate of DIC patients was high (70%). Patient's mortality rate increased from score 2 to 7. There were 4 patients in the score 0 group. They progressed to overt DIC later. Therefore the mortality was high. In the score 8 group, 3 of 5 patients died. The other two were referred to other hospitals for end of life care. The correlation between mortality rate and DIC score in patients with DIC is shown in Figure 4.

The median survival of 165 patients diagnosed with DIC was 12 days. Death rate per 1,000 persons per day was 12. Patients with overt DIC had significantly shorter median survival (8 days versus 12 days) and higher

Table 4. Laboratory tests in patients with DIC (expressed as mean).

Laboratory tests	Normal range	DIC patients (n=165)
Complete blood count		
Hemoblobin (g/dL)	12-18	10.10
White blood cell count ($x10^9$/L)	4.80-10.80	13.64
Platelet count ($x10^9$/L)	140-450	641.47
Coagulogram		
Prothrombin time (sec.)	10.5-13.5	24.33
Partial thromboplastin time (sec.)	22-33	49.34
Fibrinogen (mg/dL)	165-400	243
D-dimer (mg/ml)	0-275	3,818
Clinical chemistry		
Creatinine (mg/dL)	0.6-1.3	2.45
AST (u/L)	15-37	410
ALT (u/L)	30-65	222
GGT (u/L)	5-55	216

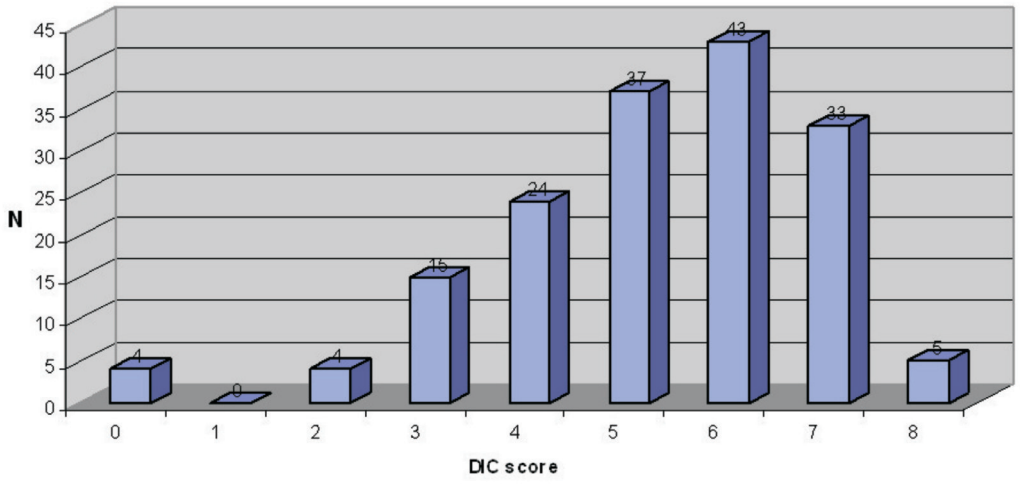

Figure 3. Number of patients in each DIC score group.

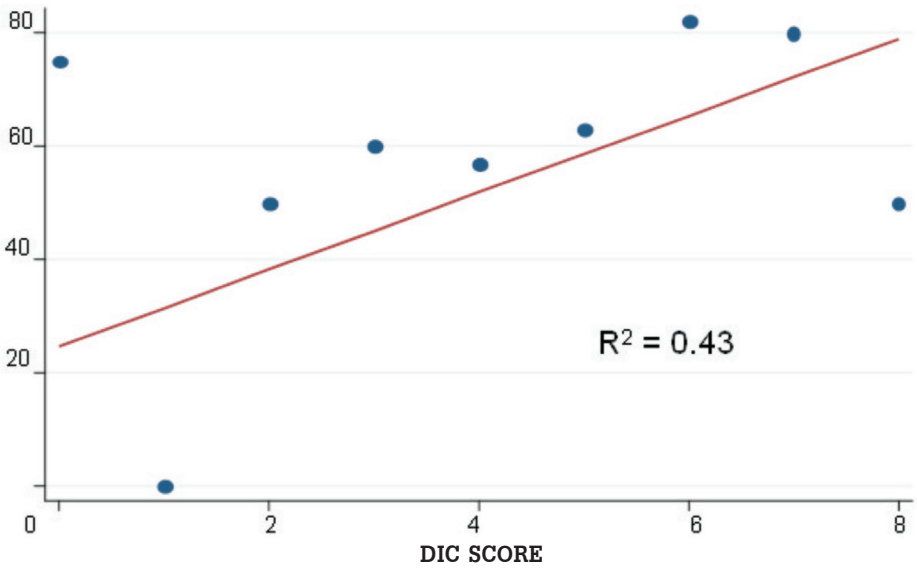

Figure 4. Correlation between mortality rate and DIC score in patients with DIC.

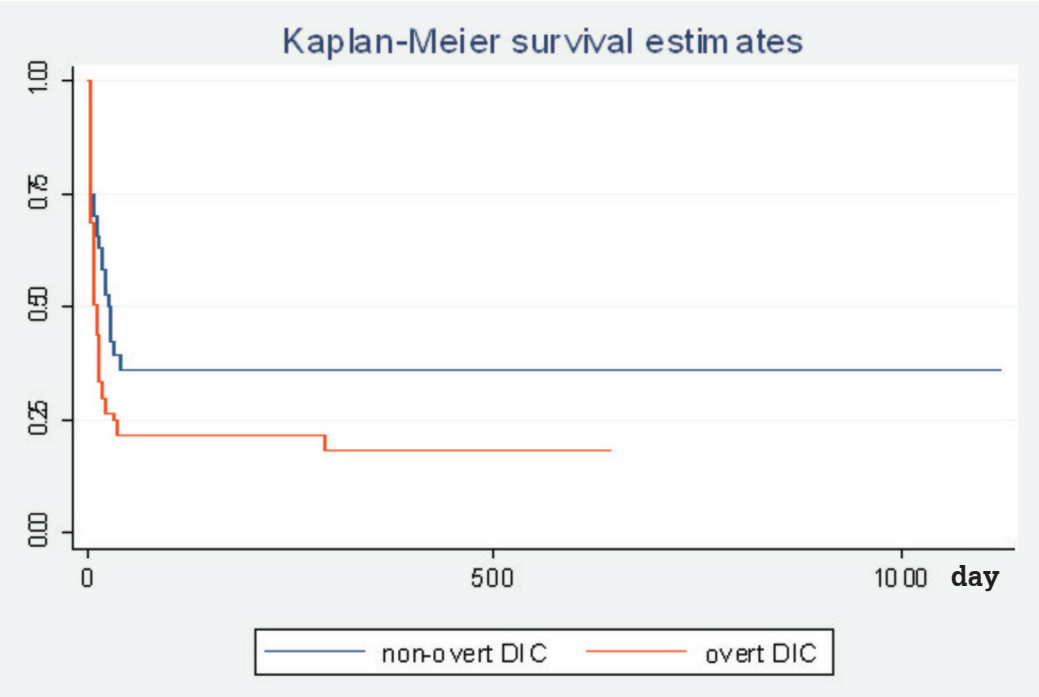

Figure 5. Survival curve of patients with overt and non-overt DIC.

death rate (16/1,000/day versus 6/1,000/day) (p=0.01). The survival curve of patients with overt and non-overt DIC is shown in Figure 5.

Prognostic factors of DIC patients were analyzed in the overt DIC group. Univariate analysis of factors affecting outcome in overt DIC patients was shown in Table 5. Factors affecting survival were male sex, ICU admission, shock, acute renal failure, respiratory failure requiring endotracheal tube, and prothrombin time of more than 19 seconds. Patients who received blood products had longer median survival. Multivariate analysis showed that patients with shock (hazard ratio [HR] 2.39; 95% confidence interval [CI], 1.64-3.51, p<0.05) or with acute renal failure (HR 1.82; 95%CI, 1.30-2.56, p<0.05) were factors significantly affecting worse survival.

Discussion

Patients with DIC in Ramathibodi Hospital had high mortality rate and short median survival. Siegal et at.[6] showed that DIC patients had mortality rate of 58% as compared with 70% in our study. Mortality rate was higher in patients admitted in the ICU (81%). Toh and Downey[7] showed that the mortality rates of patients with overt DIC and non-overt DIC were 73% and 26%, respectively. Our study showed that mortality rates of patients with overt DIC and non-overt DIC were 75% and 57%, respectively. Patients with non-overt DIC had higher mortality in our study. This might be because of the progression from non-overt DIC to overt DIC later. In our study, DIC was diagnosed when there was a confirmed underlying disease plus fulfilled laboratory criteria. We did not change the score when the disease progressed.

Sepsis was the most common etiology of DIC patients in this study, followed by malignancy. Wada et al.[8] showed that sepsis was a common cause but the most frequent etiology associated with DIC was acute promyelocytic leukemia (APL) in their study. In our study, only two patients with APL developed DIC. Treatment with all-*trans* retinoic acid during the induction period in our APL patients at Ramathibodi Hospital might have contributed to the low incidence of DIC in these patients.

Co-morbidity factors that were found in DIC were shock, respiratory failure, and acute renal failure. These patients were admitted in the ICU and had higher mortality. Heart disease, including myocardial infarction, cardiac arrhythmia, and congestive heart failure were found in about 10% of cases but they did not affect

Table 5. Univariate analysis of factors affecting outcome in 118 patients with overt DIC.

Factors	No. of patients	No. of death	Time at risk (day)	Death rate/1000/ day	Median survival time (day)	P-value
Sex						
Male	67	56	2163	26	6	0.01
Female	51	32	3279	10	14	
Age						
< 60 year old	55	39	2042	19	7	0.85
≥ 60 year old	63	49	3400	14	12	
Ward						
ICU	80	65	3054	21	6	< 0.01
non-ICU	38	23	2388	10	20	
Diagnosis						
Sepsis/severe infection	90	69	4831	14	7	0.54
Malignancy	10	6	382	15	32	
Trauma/accident	1	1	5	200	0	
Operative complication	5	5	51	100	7	
Others	11	7	144	49	18	
Comorbidity						
Shock	84	69	3006	23	6	< 0.01
Acute renal failure	71	58	2273	26	7	0.03
Chronic renal failure	12	10	376	27	6	0.43
ARDS	6	5	234	21	6	0.62
Respiratory failure requiring endotracheal tube	90	76	2874	26	6	< 0.01
Non-hematologic malignancy	30	24	1451	17	7	0.68
Hematologic malignancy	9	7	374	19	8	0.79
Clinical manifestation						
Clinical bleeding						
Yes	58	47	2569	18	9	0.65
No	60	41	2873	14	7	
Treatment						
Anticoagulant use						
Yes	11	6	658	9	3	0.07
No	107	82	4784	17	7	
Recombinant factor VIIa use						
Yes	5	4	58	69	7	0.96
No	113	84	5384	16	8	
Tranexamic acid use						
Yes	12	7	1663	4	18	0.05
No	106	81	3779	21	7	
Vitamin K use						
Yes	62	45	3387	13	13	0.08
No	56	43	2055	21	6	
Blood products use						
Yes	106	79	5341	15	9	0.02
No	12	9	101	89	2	
Abnormal lab test						
Platelet < 50 x 10^9/L	67	50	2584	19	7	0.68
Platelet > 50 x 10^9/L	51	38	2858	13	12	
PT ≥ 19 sec.	74	61	2848	21	6	<0.01
PT < 19 sec.	44	27	2594	10	20	
PTT ≥ 36 sec.	81	62	3729	17	7	0.26
PTT < 36 sec.	37	26	1713	15	12	
D-dimer ≥ 900 mg/ml	91	68	2943	23	8	0.69
D-dimer < 900 mg/ml	27	20	2499	8	6	
Fibrinogen ≥ 100 mg/dL	30	21	1321	16	9	0.78
Fibrinogen < 100 mg/dL	88	67	4121	16	8	

mortality significantly.

Bleeding was frequent in DIC patients. The most common site was gastrointestinal bleeding which was in the upper tract more than the lower tract. We detected bleeding early in ICU patient with NG tube. Bleeding from endotracheal tube might be late but the mortality rate was not different from patients with other bleeding sites. Thrombosis was seen in fewer cases. Thrombosis in DIC patients occurred more common in the microvascular circulation and manifested as organ failure rather than signs of thrombosis in major blood vessels. Treatment of DIC varied depending on the clinician's decision and the patient's conditions. Patients who received blood products seemed to fare better. The median survival of DIC patients was 12 days. Patients with overt DIC had shorter median survival than patients with non-overt DIC. Patients with acute renal failure and patients with shock had worse survival. Early diagnosis and treatment might improve the prognosis of these patients.

In summary, the mortality rate of patients with DIC was high, particularly those admitted in the ICU. Sepsis was the most common etiology of DIC. It is useful to establish standard guideline for early diagnosis and treatment of DIC. The limitation of this study is that it is a retrospective study. Further prospective study to see whether restoration of coagulation and physiological anticoagulant pathways will improve the prognosis of patients with DIC is warranted.

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ภาวะ Disseminated Intravascular Coagulation ในโรงพยาบาลรามาธิบดี

ปิยะณัฐ มหานุภาพ[1], พันธุ์เทพ อังชัยสุขศิริ[1] และ ศศิวิมล รัตนสิริ[2]

หน่วยโลหิตวิทยา ภาควิชาอายุรศาสตร์[1] หน่วยระบาดวิทยาคลินิค สำนักงานวิจัยคณะฯ[2] คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี มหาวิทยาลัยมหิดล กรุงเทพฯ

บทคัดย่อ : *ภาวะ Disseminated intravascular coagulation (DIC) เป็นภาวะที่มีการกระตุ้นการแข็งตัวของเลือดทำให้เกิดไฟบรินในเส้นเลือดขนาดเล็ก ทำให้เกิดภาวะล้มเหลวของอวัยวะต่าง ๆ ทั่วร่างกายตามมา อาการและอาการแสดงคือภาวะเลือดออกจากการที่มีการใช้ปัจจัยการแข็งตัวของเลือดและของเกร็ดเลือด ผู้ป่วยภาวะนี้มีจะอัตราการเสียชีวิตสูง การศึกษานี้เป็นการศึกษาการรอดชีวิตและอัตราการเสียชีวิตของผู้ป่วยที่เกิดภาวะนี้ขึ้นในโรงพยาบาล โดยจะวิเคราะห์ปัจจัยที่มีผลต่อการรอดชีวิตของผู้ป่วยด้วย การศึกษาเป็นแบบย้อนหลัง โดยเก็บข้อมูลจากแฟ้มประวัติผู้ป่วยที่ได้รับการวินิจฉัยว่าเป็น DIC ตั้งแต่เดือนมกราคม 2542 ถึงเดือนธันวาคม 2551 ผู้ป่วยที่ศึกษาเป็นผู้ป่วยผู้ใหญ่ที่นอนโรงพยาบาลและได้รับการวินิจฉัยภาวะ DIC ตามเกณฑ์ของ International Society on Thrombosis and Haemostasis ปี พ.ศ. 2542 ผลการศึกษาพบมีผู้ป่วย 165 ราย โดย 118 รายเป็น overt DIC และ 47 รายเป็น non-overt DIC เป็นเพศชายร้อยละ 54 เพศหญิงร้อยละ 46 อายุเฉลี่ย 61.5 ปี สาเหตุที่ทำให้เกิดภาวะ DIC มากที่สุดคือการติดเชื้อรองลงมาเป็นโรคมะเร็ง อาการแสดงของผู้ป่วย DIC ที่พบบ่อยที่สุดคือการที่มีภาวะเลือดออก อัตราการเสียชีวิตของผู้ป่วยที่มี overt DIC เท่ากับร้อยละ 75 ในผู้ป่วยที่มี non-overt DIC ร้อยละ 57 ผู้ป่วยที่มีภาวะ overt DIC จะมีชีวิตสั้นกว่าผู้ป่วย non-overt DIC อย่างมีนัยสำคัญทางสถิติ (8 วันเทียบกับ 28 วัน, p = 0.01) โดยการวิเคราะห์ multivariate พบว่าปัจจัยที่มีผลทำให้การรอดชีวิตของผู้ป่วยลดลงคือภาวะช็อคและภาวะไตวายเฉียบพลัน เนื่องจากผู้ป่วยที่มีภาวะ DIC มีอัตราการเสียชีวิตสูงและการรอดชีวิตสั้น การมีแนวทางวินิจฉัยภาวะ DIC และการรักษาตั้งแต่ระยะแรกอาจทำให้การพยากรณ์โรคของผู้ป่วยที่มีภาวะ DIC ดีขึ้นได้*

Key Words : ● *Disseminated intravascular coagulation* ● *DIC*

วารสารโลหิตวิทยาและเวชศาสตร์บริการโลหิต 2553;20:27-37.