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Retrospective analysis of the risk of hemorrhage associated with moderate and severe thrombocytopenia of 173 patients with systemic lupus erythematosus

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Abstract

The aim of the study was to observe the risk of hemorrhage from moderate and severe thrombocytopenia in systemic lupus erythematosus (SLE).

A retrospective analysis was undertaken of cases admitted to Qilu Hospital, China. Blood platelet counts (BPCs) of $\leq 20 \times 10^9$/L represent severe thrombocytopenia, and a BPC of 21 to 50×10^9/L indicates moderate thrombocytopenia. A comparison was made from the perspective of severity with a view to determine the influence of thrombocytopenia on the risk of hemorrhage and the results.

Moderate and severe thrombocytopenia occurred in 173 cases, accounting for 15.2% of the total hospitalized patients with SLE with a male to female ratio of 1:23.7. The average age of those patients was 34.8 ± 14.6 years. In the group of severe thrombocytopenia, patients without visceral involvement had a mean age of onset of 31.4 ± 14.2 years with a median of 28.0 years compared with 37.8 ± 14.8 years with a median of 38.5 years for patients with visceral involvement; this difference was statistically significant ($P = .034$). Seventy-one (76.3%) of 93 patients with severe thrombocytopenia and 20 (25.0%) of 80 patients with moderate thrombocytopenia developed hemorrhagic conditions of various grades, the difference between both were markedly statistically significant. Twenty-three patients with SLE died. Nine deaths were due to a hemorrhage caused by thrombocytopenia, while more were caused by infection.

Severe thrombocytopenia is a significant adverse prognostic factor of SLE. SLE with the main manifestation of thrombocytopenia tends to make younger visceral organ owners suffer.

Abbreviations: AIHA = autoimmune hemolytic anemia, BPC = blood platelet counts, GC = glucocorticoid, ITP = immune thrombocytopenia, IWG = International Working Group, LN = lupus nephritis, NPSLE = neuropsychiatric systematic lupus erythematosus, SLE = systemic lupus erythematosus, SLEDAI = SLE disease activity index.

Keywords: hemorrhage, lupus erythematosus, thrombocytopenia

1. Introduction

Thrombocytopenia a common blood system manifestation in patients with systemic lupus erythematosus (SLE). Reportedly, 9.5% to 44.5% of patients with SLE have thrombocytopenia complications of different grades.[1–3] No significant increase in the risk of hemorrhage was found in patients with SLE with mild thrombocytopenia, while those with severe thrombocytopenia frequently developed bleeding, indicating that it was an important adverse prognostic factor.[2,4,5] Ktona et al stated that thrombocytopenia, as an independent factor, had nothing to do with visceral involvement, but presumably played a role in prognosis.[6] Recently, Abdel Galil et al found that thrombocytopenia was associated with the activity of SLE, and was closely related to arthritis, nervous involvement, and lupus nephritis (LN); in addition, blood platelet counts (BPCs) demonstrated an inverse correlation with the activity of SLE.[7] Therefore, a retrospective analysis on the risk of hemorrhage and treatment of 173 hospitalized patients with SLE with moderate and severe thrombocytopenia was undertaken and analyzed.

2. Patients and methods

2.1. Data collection

A retrospective review was undertaken on admitted patients with SLE (age ≥14 years) who had presented with thrombocytopenia from January 2012 to December 2015 in Department of Rheumatology, Qilu Hospital, China. All patients were in compliance with the SLE classification criteria of the American College of Rheumatology in 1997.[8] Their peripheral BPCs in the morning were $<50 \times 10^9$/L on at least 2 occasions, ruling out pseudothrombocytopenia, drug-induced thrombocytopenia, as well as thrombotic thrombocytopenia and disseminated intravascular coagulation. According to the classification method by Jallouli et al,[9] BPC $>50 \times 10^9$/L $<100 \times 10^9$/L represents mild thrombocytopenia (not included in the study), $>20 \times 10^9$/L $\leq 50 \times 10^9$/L is

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moderate thrombocytopenia, and $\leq 20 \times 10^9$/L is severe thrombocytopenia. Hemorrhagic conditions were obtained by clinical observation, while bleeding in the renal capsule and the cerebrum was detected and determined by computed tomography. The hemorrhage classification method was revised based on the criteria by Ziakas et al[4] and the Massachusetts Medical Center[10] (grade 3 and grade 4 requiring daily blood transfusion in the latter standard were combined with grade 3). That is, grade 0, no bleeding; grade 1, mucocutaneous hemorrhage, flaky ecchymosis around the hole left by the injection needle, bleeding spots in the skin or purpura; grade 2: obvious hemorrhage, such as bleeding in the nose, urinary, and genital system or digestive system; grade 3: hemorrhage that requires more than 1 unit of red blood cells a day for transfusion, such as life-threatening intracranial hemorrhage and hemorrhage in the respiratory system. Disease activity at admittance was measured by the SLE disease activity index (SLEDAI).[11] Systematic therapy included a glucocorticoid (GC), hydroxychloroquine, and an additional danazol administration for patients with SLE with critical thrombocytopenia. When the above treatment did not induce a satisfactory response within 4 to 6 days for patients with severe thrombocytopenia, 20 g/d intravenous immunoglobulin was administered for 5 consecutive days. Conventional immunosuppressive agents, such as mycophenolate mofetil, cyclosporine A, tacrolimus (FK506), and vincristine or other immunosuppressive agents were prescribed for treatment, and in some patients with severe conditions who failed treatment with these medicines, rituximab 100 mg intravenous drip was administered once weekly for 5 doses, or splenectomy was performed. All the patients were observed closely for their skin and mucosal hemorrhagic conditions and the use of drugs that affect platelet aggregation was avoided. For patients with severe thrombocytopenia, besides close observation of the hemorrhagic conditions, epinephrine was applied locally for the treatment of obvious bleeding, such as in the gingiva or nasal cavity; otherwise, hemostasis was achieved through packing or compression if epinephrine was ineffective. Etisalat and ammonium acetate were administered through intravenous injection to patients with clinical manifestations of bleeding based on their severity. Vitamin K1 30 mg/d was administered through intravenous drip for patients with abnormal liver function. Patients with BPC lower than 10×10^9/L with grade 2 hemorrhage or severe thrombocytopenia with visceral hemorrhage received 1 to 2 units of platelets (each unit containing approximately 2.5×10^{10} platelets) through intravenous infusion. For patients without evidence of bleeding, hemostatic products were not used for prognostic purposes. About 1 to 2 units of washed red blood cells were transfused in patients with a hemoglobin lower than 70 g/L or who were suffering from hypotension and increased heart rate due to obvious bleeding. Appropriate antibiotic therapy was provided for infections and corresponding treatments for systematic manifestations were performed.

Because this observational study was based on a review of medical records obtained for clinical purposes, the requirement for ethical approval and written informed consent was waived, and patients' records/information were anonymized before analysis.

2.2. Statistical analyses

The statistics were processed using the Graph Pad InStat program, the count data by the Chi-squared test or Fisher exact test and measurement data by the *t* test, with $P < .05$ considered significant.

3. Results

A total of 1138 patients with SLE were admitted into the hospital from January 2012 to December 2015, including 101 male and 1037 female patients with a male to female ratio of 1:10.3. Moderate and severe thrombocytopenia occurred in 173 patients with SLE (15.2%), consisting of 7 males and 166 females, with a male to female ratio of 1:23.7. The mean age of the patients with SLE with thrombocytopenia was 34.8 ± 14.6 years. Specifically, 80 patients, 4 males and 76 females, experienced moderate thrombocytopenia, with a male to female ratio of 1:19.0 and an average age of 34.8 ± 14.5 years. A total of 93 patients, 3 males and 90 females, developed severe thrombocytopenia, with a male to female ratio of 1:30.0 and an average age of 35.0 ± 14.7 years. There was no statistically significant difference in sex and age in the groups ($P = .7052$, $P = .9293$). The complication of fever occurred in 17 (9.8%) patients with moderate and severe thrombocytopenia, infection occurred in 54 (31.2%), LN in 41 (23.7%), neuropsychiatric SLE (NPSLE) in 16 (9.3%), lupus skin lesions in 33 (24.2%), arthritis in 17 (29.4%), pregnancy in 11 (6.4%), pancytopenia in 18 (10.4%), leucopoenia in 24 (13.9%), autoimmune hemolytic anemia (AIHA) in 5 (2.9%), and other various infections in 55 (31.8%). There was no significant difference between groups in the prevalence of the above systematic manifestations (data not shown).

Twenty (25.0%) of the 80 patients with SLE with moderate thrombocytopenia experienced bleeding of various degrees compared with 71 (76.3%) of the 96 patients with SLE with severe thrombocytopenia. The difference between groups in this respect was of statistical significance ($P = .0001$). As shown in Table 1, 1 (4.5%) of the 22 patients with SLE with mild thrombocytopenia ($51–60 \times 10^9$/L) presented with dermatorrhagia, fewer than in the

Table 1

Hemorrhagic conditions of 173 patients with systemic lupus erythematosus with moderate and severe thrombocytopenia.

BPC $\times 10^9$/L	0–10	11–20	21–30	31–40	41–50	51–60
Number of cases	57	36	27	20	33	22
Grade 0	13	12	17	16	27	21
Grade 1	33	17	7	3	5	1
Grade 2	7	5	2	1	1	0
Grade 3	7	2	1	0	0	0
Sum of grades 1–3	47	24	10	4	6	1
Rate of hemorrhage, %	82.5	66.7	37.0	20.0	18.2	4.5
P	.1316	**.0240**	.3339	1.0000	.2226	

Grade 0 indicates no bleeding; grade 1, bleeding only in the skin and mucosa; grade 2, bleeding in the urinary, genital or digestive systems; and grade 3, intracranial hemorrhage, respiratory system hemorrhage or hemorrhage requiring transfusion of at least 1 unit of red blood cells per day. The rate of hemorrhage of 76.3% in 93 severe thrombocytopenic patients was significantly higher than that in patients with moderate thrombocytopenia ($P = .0001$). The rate of hemorrhage of 80 patients with moderate thrombocytopenia was 25.0%, which was much higher than in the patients with mild thrombocytopenia whose BPC was within 51 to 60×10^9/L (4.5%, $P = .0338$). *P*-value $< .05$ is shown in bold.

BPC = blood platelet counts.

group of patients with SLE with moderate thrombocytopenia ($P = .0338$). In that group, the incidences of hemorrhage in patients with BPC of 41×10^9/L to 50×10^9/L, 31×10^9/L to 40×10^9/L, and 21×10^9/L to 30×10^9/L were 18.2%, 20.0%, and 37.0%, respectively, demonstrating an increasing tendency, but the difference was not statistically significant ($P > .05$). In contrast, the incidence of bleeding in patients with BPC $\leq 10 \times 10^9$/L was higher than in patients with BPC of 11×10^9/L to 20×10^9/L, 82.5% and 66.7%, respectively, although the difference was not statistically significant. The comparison of the incidence of bleeding between patients with BPC of 11×10^9/L to 20×10^9/L and patients with BPC of 21×10^9/L to 30×10^9/L (37.0%), which was higher in the former group, was statistically significant ($P = .024$). Of the 9 patients who died as a result of thrombocytopenia, 7 were in the group of patients with severe thrombocytopenia.

During admission, 83 patients were noted to have hemorrhages, all of whom had bleeding due to the pinhole of an intravenous injection and flaky ecchymosis around the pinhole, scattered bleeding spots in the skin or purpura. Fifty-one patients (61.4%) had bleeding spots in the skin or purpura, 20 patients (24.1%) had ecchymosis in the mouth mucosa and errhysis in the gingiva, 12 patients (14.5%) had epistaxis requiring hemostasis by compression by an otolaryngologist; 10 patients (12.0%) had hypermenorrhea or vaginal bleeding, 1 patient (1.2%) had nephrorrhagia, 1 patient (1.2%) had a perirenal hematoma, 3 patients (3.6%) had alimentary tract hemorrhages, 4 patients (4.8%) had hemoptysis, and 3 patients (3.6%) had intracranial hemorrhage. Multisystem damage was a typical feature of SLE. Of the 173 patients with SLE, 73 (42.2%) presented with the main manifestation of thrombocytopenia involving the skin and mucosa or joints and muscles; the remaining 100 patients (57.8%) presented with thrombocytopenia with visceral involvement and/or infection. The 45 patients with severe thrombocytopenia without visceral involvement had a mean age of onset of 31.4 ± 14.2 years, with a median age of onset of 28.0 years; the 48 patients with visceral involvement, however, had an average age of onset of 37.8 ± 14.8 years, with a median of 38.5 years, and the difference between both was statistically significant ($P = .034$). Based on whether there was hemorrhage, 2 distinct groups of thrombocytopenic patients emerged, namely 1 group with hemorrhagic conditions and 1 group without hemorrhagic conditions, allowing for comparisons between system involvement in the incidence of hemorrhage. As shown in Table 2, the incidence of hemorrhage complicated by LN and fever was rare ($P = .0498$ and $P = .0422$, respectively). Other types of system involvements had no statistical significance. Further analysis revealed that 37 (90.2%) of the 41 cases complicated by LN and 11 of the 17 (64.7%) cases complicated by fever had BPC higher than 21×10^9/L, indicating that it was the direct cause of the lower incidence of hemorrhage and that LN and fever mainly occurred in patients with moderate thrombocytopenia. The difference between the hemorrhage and nonhemorrhage groups of patients was complicated by systematic involvement, and SLEDAI had no statistical significance. Twenty-three patients in the study died. Of the direct causes of death (shown in Table 3), 9 deaths were due to hemorrhage associated with thrombocytopenia, including 3 intracranial hemorrhages, 3 alimentary tract hemorrhages, 1 case of hemoptysis, 1 case of vaginal bleeding, and 1 urinary system hemorrhage. Seven of these patients were in the severe thrombocytopenia group, and 2 patients were in the moderate thrombocytopenia group, specifically, 1 case of bronchiectasis and 1 case of secondary bleeding after intestinal perforation. In the cases that resulted in death, 10 were in patients with BPC lower than 11×10^9/L, and 2 were in patients with BPC of 11×10^9/L to 20×10^9/L had received transfusion of 1 to 2 units of blood platelets but were not saved. Other deaths included 5 patients due to septicemia, 2 with severe pneumonia, 2 pulmonary aspergillosis infections, 2 patients with interstitial lung disease and infection, 1 NPSLE, and 1 pancytopenia (fever, anemia, purpura). The causes of death were complicated, as exemplified by the death due to pancytopenia which involved fever, anemia, purpura, anemic heart disease, leukemia, and secondary infection.

Table 2

Clinical comparison between hemorrhagic and nonhemorrhagic conditions among patients with systemic lupus erythematosus (SLE) with moderate and severe thrombocytopenia.

Item	Hemorrhage (83 cases), n (%)	Nonhemorrhage (90 cases), n (%)	*P*
Moderate thrombocytopenia	22 (26.5)	58 (64.4)	**.0001**
Severe thrombocytopenia	61 (73.5)	32 (35.6)	**.0001**
Gestation	5 (6.0)	6 (6.7)	1.0000
Fever	4 (4.8)	13 (14.4)	**.0413**
Infection	23 (27.7)	33 (36.7)	.2553
Pulmonary infection	11 (13.3)	12 (13.3)	1.0000
LN	14 (16.9)	27 (30.0)	**.0498**
NPSLE	4 (4.8)	12 (13.3)	.0672
AIHA	1 (1.2)	4 (4.4)	.3698
Pharmacopeia	10 (12.1)	8 (8.9)	.6199
Leukopenia	10 (12.1)	14 (15.6)	.5196
Arthritis	10 (12.1)	14 (15.6)	.5196
Lupus rash	12 (14.5)	21 (23.3)	.1756
Herpes Zoster	2 (2.4)	3 (3.3)	1.0000
Interstitial lung disease	6 (7.2)	5 (5.6)	.7597
Pulmonary arterial hypertension	2 (2.4)	2 (2.2)	1.0000
Orrhomeningitis	3 (3.6)	5 (5.6)	.7219
Related liver diseases	1 (1.2)	3 (3.3)	.6219
Hyperthyroidism	1 (1.2)	1 (1.1)	1.0000
Anticardiolipin antibody syndrome	5 (6.0)	5 (5.6)	1.0000
Raynaud system	7 (8.4)	12 (13.3)	.3394
SLEDAI	9.9 ± 4.7	10.3 ± 4.3	.5894
Death	10 (12.1)	13 (14.4)	.6620

P-value $<.05$ is shown in bold.

AIHA = autoimmune hemolytic anemia, LN = lupus nephritis, NPSLE = neuropsychiatric systematic lupus erythematosus, SLEDAI = SLE disease activity index.

4. Discussion

Thrombocytopenia, which is hazardous to patients and difficult to treat, is one of the most common hematologic manifestations of SLE. Mild thrombocytopenia is unlikely to cause patients harm but likely has some diagnostic significance. The 173 cases in this study included all patients whose BPC was lower than 50×10^9/L. Ninety-three of the patients with severe thrombocytopenia were hospitalized because of thrombocytopenia alone or in addition to another reason for hospitalization, and some patients with moderate thrombocytopenia were admitted for other systemic injuries. Clear definitions have been made for the severity of thrombocytopenia in clinical hematology. BPC $\leq 50 \times 10^9$/L[1] was collectively categorized as critical thrombocytopenia and subdivided into moderate thrombocytopenia (BPC of 20–50 $\times 10^9$/L) and severe thrombocytopenia (BPC lower than 20×10^9/L) based on the classification method by Ziakas et al[4] and Jallouli et al.[9] Moderate and severe thrombocytopenia were

Table 3

Major causes of 23 deaths.

BPC $\times 10^9$/L	n	Death (n)	Major causes of death	Organ injuries	Death due to infection (n)	Death due to hemorrhage (n)
0–10	57	10	4 sepsis, 1 pulmonary infection, 2 cerebral hemorrhage, 1 hemorrhage in alimentary tract, 1 uterine hemorrhage, 1 hematuria		5	5
11–20	36	6	2 sepsis, 2 pulmonary infection, 1 cerebral hemorrhage, 1 hemorrhage in alimentary tract		4	2
21–30	27	4	1 pulmonary infection, 2 respiratory failure caused by pulmonary fibrosis, 1 hemoptysis	2	1	1
31–40	20	1	1 neuropsychiatric lupus	1		
41–50	33	2	1 panhematopenia (anemic heart disease, heart failure and fever), 1 intestine perforation, and hemorrhage	1		1
Total	173	23			10	9

In the 23 deaths in patients with moderate-to-severe thrombocytopenia, 16 occurred in the group of 93 severe thrombocytopenic patients and 7 occurred in the group of 80 moderate thrombocytopenic patients, which did not achieve statistical significance ($P = .1196$). Nine patients died directly due to hemorrhage and 10 died of related infections.
BPC = blood platelet counts.

more commonly found in young females in this study, and the age of onset of severe thrombocytopenia in patients with thrombocytopenia as the main manifestation was younger than in those patients with visceral involvement. It can be inferred from Table 1 that the significant difference ($P = .024$) in hemorrhage risk was shown only between BPC of 11×10^9/L to 20×10^9/L and 21×10^9/L to 30×10^9/L, presumably indicating the value was in accordance with clinical practice to be regarded as the dividing point of moderate and severe thrombocytopenia, similar to the classification in clinical hematology. Table 1 shows that the decrease in BPC led to a correspondingly increasing risk of hemorrhage, but it did not definitely contribute to hemorrhage, since patients with BPC lower to 10×10^9/L showed no evidence of hemorrhage. In those cases, most hemorrhages occurred in the skin or mucosa, or at least ecchymosis due to an injection pinhole. As a result, once severe thrombocytopenia is found, close observation should be performed to check whether there are new petechiae in the skin or mucosa and whether there is evidence of hemorrhage in the urine, stool, or phlegm. As it is well known that patients with immune thrombocytopenia (ITP) generally experience no bleeding if their BPC is above 20×10^9/L.[12] The results of this study indicated an obvious decrease in bleeding in patients with SLE whose BPC were within 21×10^9/L to 30×10^9/L, and the difference was statistically significant, although 37.0% of these patients still suffered hemorrhages. It can be inferred that hemorrhagic manifestations of SLE differ from those of ITP, since the former is due to multisystemic involvement, while the latter is mainly caused by damage within the blood. Table 1 also revealed that hemorrhage was rare and mild in patients with BPC of 21×10^9/L to 30×10^9/L, affecting the skin or mucosa instead of other more serious manifestations. Similar to ITP, if the BPC was $\geq 31 \times 10^9$/L, generally no hemorrhage occurred unless causative factors emerged.[13] Thus, this value can be regarded as the warning line of hemorrhage. Alonso et al have reported that thrombocytopenia in SLE tended to occur in male patients,[14] but the results obtained in our study indicated thrombocytopenia in SLE was mostly seen in young females, and the age of patients at with the main indication of thrombocytopenia at onset was younger than in the patients with visceral involvement. In an 8-year study, Laustrup et al[15] suggested that younger patients with active SLE were more likely to develop thrombocytopenia.

Ziakas et al[4] and Jallouli et al[9] have undertaken studies on 50 and 30 patients with SLE thrombocytopenia, respectively, via control methods. Their study results revealed that thrombocytopenia was related to concomitant LN, NPSLE, pericarditis, leucopoenia, infection, the activity of lupus, etc. In our study, most cases complicated by LN and fever occurred in the moderate thrombocytopenia group, explaining why their bleeding was mild in spite of the existence of thrombocytopenia. Further study shall expand the samples to understand the impact of other visceral damage factors on hemorrhagic conditions of SLE with thrombocytopenia. Undoubtedly, the risk of bleeding increased as the thrombocytopenia increased in severity. Death due to hemorrhage directly caused by thrombocytopenia, however, only accounted for 39% of deaths, with intracranial hemorrhages, alimentary tract hemorrhages, hemoptysis, and other visceral hemorrhages being the most dangerous manifestations. According to Gao et al, the results of the study on SLE associated with intracranial hemorrhage revealed that thrombocytopenia was an independent risk factor.[7,16] As the results in the article showed, 7 of 9 deaths due to hemorrhage occurred in the severe thrombocytopenia group, and the remaining 2 deaths occurred in the moderate thrombocytopenia group and were caused by intestinal perforation and bronchiectasis, both due to obvious tissue damage factors.[16] Generally, bleeding in the skin or mucosa is rarely fatal. As proven in this study, deaths directly caused by thrombocytopenia only accounted for 39.1% (9/23) of deaths, compared with infection, which accounted for 43.5% (10/23) of deaths and more than 60% if combined with organ diseases such as respiratory failure in interstitial lung disease and death by pancytopenia, in which infection was considered to play a direct or indirect factor. As deaths were caused by hemorrhage in the cerebrum, alimentary tract or urogenital system, patients with thrombocytopenia with a risk of hemorrhage should be protected from these causes of bleeding. Bradbury and Murray[13] believed that the use of platelet inhibitors such as nonselective Cox-2 nonsteroidal anti-inflammatory drugs and dipyridamole should be prohibited when BPC is lower than 50×10^9/L; infection-related intense coughing or sudden elevations in blood pressure should be controlled, and patients should rest, and if necessary, be provided sedative therapy. Transfusion of platelets made a significant difference in the temporary improvement of bleeding tendency. It is believed that, compared with the control group, platelet transfusion could reduce and prevent the risk of hemorrhage caused by BPC lower than 10×10^9/L from tumor chemotherapy, although, in fact, hemorrhage was still frequently seen after platelet transfusion.[9] Platelet transfusion played a positive role in the improvement of fatal hemorrhage caused by thrombocytopenia. As shown in the results of the study, the clinical manifestations of SLE with thrombocytopenia were multisystem, involving complicated factors of hemorrhage and

hemostasis of which platelets were only one. Therefore, it is essential to strictly follow the indications of platelet transfusion. If patients with BPC lower than 10×10^9/L present with severe bleeding, bleeding tendency or induced labor and surgery, platelet transfusions should be administered.[17] Considering that GCs and immunosuppression contribute to decreases in immunity against pathogenic microorganisms, it is not recommended to use large dosages of GCs for avoidance of infection.[18–20]

The International Working Group (IWG) on ITP recently described new terminology, uniform definitions, and outcome criteria for the diagnosis and management of ITP in children and adults.[21] The IWG has created accurate definitions in terms of classifications of hemorrhage, such as bleeding point, ecchymosis, the diameter of the hematoma around injection tissue, etc.[21] Considering that our study is retrospective, the analysis had to be undertaken in accordance with the original definition. In these cases, only large amounts of red blood cells in the urine was regarded as evidence of hemorrhage, since positive urine occult blood is common in patients with lupus and especially in those patients with LN. It also explains why melena and bloody stool, instead of positive occult blood in stool were included as the indicators. The life-threatening factors of SLE in patients with thrombocytopenia were complicated and associated with several diatheses, such as infection and visceral involvement to organ dysfunction. For example, the death was due to panhematopenia, which was associated with severe anemia, cardiac insufficiency due to anemic heart disease, infections caused by leukopenia. In this study, only the main lethal factor was considered during analysis.

Thrombocytopenia, one of the common clinical manifestations of SLE, mostly occurs in young females. Its severity exerts an influence on the prognosis of patients. When BPC is lower than 30×10^9/L, the risk of hemorrhage increases. Patients with severe thrombocytopenia should focus on the prevention and timely control of hemorrhages. As hemorrhage with BPC lower than 10×10^9/L might endanger the life of patients, special attention should be provided. Hazard factors influencing the prognosis of patients other than hemorrhage include secondary infection and visceral failure.

Author contributions

Conceptualization: Jie Li.
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