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MYELOPROLIFERATIVE DISEASE IN PATIENTS WITH A HISTORY OF MULTIPLE BLOOD DONATIONS: A REPORT OF 8 CASES

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ABSTRACT

Background. **The clonal origin of myeloproliferative disorders has been clearly demonstrated and it is known that reactive thrombocytosis occurs as a non specific response to various inflammatory or neoplastic conditions. Only a few papers have discussed the topic of myeloproliferative diseases in blood donors.**

Materials and Methods. **We report 8 cases of myeloproliferative diseases (3 polycythemia vera and 5 essential thrombocythemia) in blood donors out of a total of 44 myeloproliferative disorders diagnosed in our Department during the last 5 years on the basis of the criteria established by the Polycythemia Vera Study Group criteria. As controls we considered 61 patients with reactive thrombocytosis referred to our Department in the same period of time. The estimated odds ratio was calculated according to standard methods.**

Results. **The prevalence of blood donors with myeloproliferative disorders was 18.1%, while that of donors with reative thrombocytosis was 3.2%. The estimated odds ratio was 6.56 with a 95% confidence interval between 1.07 and 17.3. No other single factor except blood donations was frequent in the past history of these patients.**

Conclusions. **Our data seem to indicate that both thrombocytosis and erythrocytosis resembled primary forms in these subjects; however, none of them suffered serious thrombotic and/or hemorrhagic symptoms. Our study indicates the importance of paying due attention to the blood cell counts of blood donors.**

Key words: myeloproliferative diseases, blood donors, essential thrombocythemia, polycythemia vera

Reactive thrombocytosis (ST) occurs as a non specific response to chronic, inflammatory or neoplastic conditions and as a consequence of splenectomy;[1] reactive polyglobulia develops in patients with malignancies (kidney, uterus, etc.), decreased blood oxygen saturation or kidney diseases.[2] On the contrary, the clonal origin of polycythemia vera (PV) and essential thrombocythemia (ET) has been clearly demonstrated.[3,4] No description of thrombocytosis and only a few of polyglobulia in blood donors is available, to our knowledge, in the literature. However, the observation of some cases of myeloproliferative diseases (MPD) in blood donors has come to our attention in recent years. The purpose of this report is to communicate data about 8 patients with a history of blood donations who developed MPD.

Patients and methods

During the last 5 years, 19 subjects affected by polycythemia vera (PV) and 25 by essential

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Table 1. Main features of 8 patients with myeloproliferative disorders and a history of blood donations.

patient disorder	*platelets # x 10^9/L*	*# blood donations*	*years before MPD diagnosis*	*5HT nM/10^9 platelets*	*therapy for MPD*
1 PV	471	18	6	0.56	phlebotomies
2 PV	556	60	16	0.92	P32
3 ET	786	6	2	0.63	none
4 PV	644	4	< 1	1.03	none
5 ET	509	70	17	0.66	none
6 ET	1627	8	2	1	none
7 ET	1176	8	2	0.96	none
8 ET	1132	70	17	—	ASA

MPD: myeloproliferative disorders; 5HT: serotonin; nM: nanomoles.

thrombocythemia (ET) have been diagnosed in our Department according to with the criteria established by the Polycythemia Vera Study Group (PVSG).[1,2]

As controls we considered 61 other patients with a diagnosis of secondary thrombocytosis studied in our Department over the same period of time for an increased platelet number.

In 25 out of these 61 patients, thrombocytosis was related to neoplasms, in 11 it was due to chronic inflammatory diseases, in 4 to acute infections and in 21 thrombocytosis was secondary to splenectomy performed for thrombocytopenia or for Hodgkin's disease. Among this group of patients only 2 blood donors were encountered.

Platelet serotonin content was evaluated in all patients with a partially modified Udenfriend method.[5]

The estimated odds ratio was calculated according to standard methods; the 95% confidence interval was estimated from binomial distribution.[6]

Patients

Patient #1 is a 42-year-old man who underwent 3-4 blood donations/year between 1983 and 1989. While the first blood test performed before the first donation was completely normal, the last showed a hematocrit of 59.8%.

Patient #2 is a 63-year-old woman who made blood donations for 15 years from to 40 to 55 years of age. A high hematocrit level (58.4%) was not found until 1990; however, the patient had been complaining of headaches for about 12 years before diagnosis. During the last 6 months she complained of erythromelalgia.

Patient #3 is a 43-year-old man for whom a diagnosis of ET was made after 2 years of blood donations. At the time of diagnosis his platelet count was 752×10^9/L while 6 years before it had been normal.

Patient #4 is a young man (20-year-old) who made a few blood donations in one year before showing an increased platelet number (752×10^9/L).

Patient #5 is a 60-year-old man for whom a diagnosis of ET (platelet number 609×10^9/L) was made after 17 years of donating blood.

Patient #6 is a 48-year-old man who showed a high platelet count (1672×10^9/L) after 2 years of donating blood.

Patient #7 is a 28-year-old man affected by ET (platelet number 1176×10^9/L) who was diagnosed after 2 years of blood donations.

Patient #8 is a 56-year-old man affected by ET (platelet number 1132×10^9/L) who was diagnosed after 17 years of blood donations. This patient experienced an episode of melena due

to hemorrhagic gastritis when he was treated with ASA.

Results

The main data of our patients are reported in Table 1. The prevalence of blood donors with thrombocytosis due to MPD was 18.1%, while that in donors with ST was 3.2%. The estimated odds ratio was 6.56 and the 95% confidence interval lay between 1.07 and 17.3.

Discussion

The presence of 8 MPD patients, some of whom were very young,[7] with a history of repeated blood donations out of a population of 44 patients is considered a remarkable finding. With the exception of patients #2 and #8 no thrombotic and/or hemorrhagic symptoms were reported by this group. The mean follow-up of these patients is 4.7 years, range 2 to 9 years, and all of them are still being followed in our outpatient clinic. No other single factor or feature except blood donations was common to their medial history. In all these patients the myeloproliferative disorder was suspected on the basis of periodic peripheral blood tests. Marrow iron stains were positive in all ET patients except for one reactive thrombocytosis due to sideropenic anemia. Platelet serotonin was decreased in all patients as expected in MPD.[7] Our data seem to indicate that both thrombocytosis and erythrocytosis resembled primary forms in these subjects. This leads us to suspect a *primary* origin of the disease. It is possible that the prolonged myeloid *stimulus* from phlebotomies induced inhibition of the feed-back control of committed cells for platelets or red cells.[10] However, it could also be suspected that the blood donations triggered the onset of a pre-existing latent primary myeloproliferative disease. A point in favor of this second interpretation could be the fact that there appears to be no relationship between the number and lenght of blood donations and the MPD, appears to have developed in some patients even after few blood donations made over a relatively short period of time. No hematological malignancies except PV have been reported to be more frequent in blood donors than in the general population.[8] However, this can be due to earlier detection because of the frequent blood tests carried out in such subjects.[9] To our knowledge, no data have been published, on the other hand, about the development of thrombocytosis in blood donors.

It may be worth noting that over the same period (1988-1992), a total of 90,000 blood donors were examined by the Blood Transfusion Services of Padua, Cittadella, Monselice, Dolo, Este, Palmanova and Venice. Retrospective evaluation of their blood cells counts confirmed that no other donor in addition to the 8 patients here discussed showed thrombocytosis and/or erythrocytosis. Therefore, the prevalence of PV and ET in blood donors is 8/10,000.

Eight PV/ET cases out of a total population of 90,000 blood donors seems to underscore a possible relationship between blood donations and MPD. The prevalence of PV in the general population is usually considered to be 0.6-1.8 cases/100,000[11,12] and the prevalence of ET is even less than that of PV. These figures are different from those seen in the blood donors presented here. However, it is difficult to compare blood donors and the general population: the male/female ratio is higher in our blood donors than in general population and this may lead to overestimation of the prevalence of PV which is known to be more frequent in males than in females. Moreover, no recent studies regarding the prevalence of PV in Italy are available, and a comparison with PV in Sweden has little significance for us.[13]

Our observations must be confirmed, but they do appear have remarkable potential significance.

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