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RESEARCH ARTICLE

Deficiency-related pancytopenia: retrospective study of 34 cases

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ABSTRACT

Introduction: The goal of this work was to determine the place of the deficiency-related etiology in Pancytopenia, facilitation of the diagnosis and the definition of the epidemiological, clinical and para-clinical characteristics of deficiency-related Pancytopenia.
Methodology: It is a retrospective study of 112 Pancytopenia cases of which 34 were Deficiency-related Pancytopenia taken from a data taken from a period of 5 years (2006-2010) from the Hematology Laboratory of the Mohammed V Teaching Military Hospital Rabat.
Results: 112 Pancytopenia cases were found. The result from a comparison between 2 groups of patients of medium age with or without etiological deficiency-related Pancytopenia by the "Student Test" was t = 0.001070744<0.025 and the comparison of the parameters of the
Hemogram by the ANOVA Test gave the following values: F= 0.41, p= 0.565 greater than alpha= 0.05 for a limit of 5%.
For the 34 cases of deficiency-related Pancytopenia studied, 11 were women and the rest men.
The medium age was 48.47 years. The medium level of Hb was 6.11 g/dl. Leukocyte and platelet Numeration Media were respectively 2.55 g/l and 58.78 g/l
Discussion: The etiology deficiency-related is the principal cause of Pancytopenia in the department of Hematology of the Mohammed V Teaching Military Hospital Rabat. This diagnosis demands the use of myelogram and or the determination of the quantity of vitamins or the use of therapeutic tests. The epidemiological, clinical and para-clinical characteristics are similar to those found in literature.
Conclusion: We observed the need for early diagnosis of vitamin deficiency (Vit B12 and Vit B9) coupled with the systemization of preventive measures for all persons at high risk. It is however primordial for regular follow-ups of the progression over a long period of time of patients under treatment at the aim of correcting the deficiency-related Pancytopenia

KEYWORDS

Pancytopenia-megaloblastosis-deficiency- vitamin b12- vitamin b9

History

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INTRODUCTION

Pancytopenia is defined by the simultaneous decline from the three myeloid lineages. It is a serious hematological problem, with a complicated etiological chart, often dominated by medullary aplasia [1].
The deficient pancytopenia is due to a qualitative medulllary cord failure, in which the marrow is rich but myelopoiesis deficient. This deficiency is secondary to a severe deficiency of vitamin B12 (cobalamins) and / or vitamin B9 (folates). We conducted this retrospective study on deficient pancytopenia to assess the prevalence of deficient pancytopenia in the department of Hematology of the Mohammed V Teaching Military Hospital Rabat; to find out if certain elements of the initial table made it possible to point to a deficiency etiology; in order to facilitate the diagnosis, discuss epidemiological profiles, clinical and paraclinical in patients with deficient pancytopenia.
This is a retrospective study spanning a five-year period, performed at the Hematology Department of the Mohammed V Military Teaching Hospital in Rabat.

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POPULATION OF THE STUDY

112 cases of pancytopenia were found, of which 34 cases were deficient pancytopenia.
For each patient, a data collection file has been established with the following information:
- Age and sex
- History and reasons for hospitalization
-Symptoms.
- The hemogram data such as: Hemoglobin level, platelet rate, leukocyte count, mean cell volume, and myelogram results followed as much as possible by the results of the vitamin assays.
The patients were split into two groups:
-A first group including patients with deficient pancytopenia
-A second group including subjects with non-carential pancytopenia.
The study included all patients with pancytopenia with a hemoglobin level of less than 13 g /dl(gram/deciliter) for men and less than 12 g /dl for women, a platelet count of less than 150 G /L (gram/deciliter) and a white blood cell count of less than 4 G /L

The diagnosis of deficient pancytopenia was based on the existence of cytopenia associated with vitamin deficiency and / or megaloblastosis, in the absence of any other cause of pancytopenia.
Are excluded from the study all patients with bicytopenia, patients in whom the mean cell volume was not specified and patients with multiple origin pancytopenia.

METHODOLOGY

All data were recorded on Excel 2007 and analyzed. We calculated median and mean of some parameters: age, sex, hemoglobin level, platelet count, white blood cells and mean cell volume. For the first group we did a descriptive study of the data: epidemiological, clinical and paraclinical.
Statistical analyzes were performed using the SAS version 9.2 software. Parametric tests used the ANOVA test (analysis of variance), Student's test (average comparison) and the Pearson test (correlation coefficient), given the value F = 0.41.

RESULTS

The age of patients with deficient pancytopenia ranges from 17 to 84 years, with an average of 48.47 years. About 65% of patients were over 40 years old with a peak between 51 and 60 years old. (Table I)
The 34 patients with deficient pancytopenia corresponded to 11 women and 23 men, a sex ratio of 2,09. In patients under 30 years, there is a female predominance with 06 women (66.67%) and 03 men (33.33%) and a sex ratio male / female of 0,5. For patients between 31 and 50 years old, none were female.
For those over 51 years, there is a clear predominance of men.
The antecedents related to the occurrence of the deficient pancytopenia were not always noted in the patients'files. (Table II)
The reasons for hospitalization were not always noted in the patients' files. The main reasons for hospitalization are shown in Table III. The anemic syndrome is predominant at 44.12% (Table III)
For subjects with defective pancytopenia, hemoglobin level ranges from 2.9g /dl to 10.7g /dl with an average of 6.11 g /dl and a median of 5.9 g /dl. More than 70% of patients have a hemoglobin level of less than or equal to 7g /dl. (Table IV)
In our series the mean cell volume (MCV) varies between 71,8 femtolitre (fl) and 146,5 fl with an average of 108.85 fl and a median of 109,1 fl. Of the 34 cases in this group, 22 patients (64.71%) had macrocytic anemia with MCV > 100fl, 10 patients (29.41%) had normocytic anemia and only 2 patients (5.88%) had microcytic anemia. The study of the correlation between hemoglibin and mean cell volume levels by the Pearson test gave a negative correlation coefficient r = -0.38 (> - 0.75). (Table V)
The platelet count ranged from 8 G /L to 149 G /L with an average of 58.78 G /L and a median of 50G /L. 15 patients (44.12%) had severe thrombocytopenia with an average platelet count of less than 50 G /L.
The correlation study between platelet count and hemoglobin level by the Pearson test showed a correlation coefficient: r = 0.21 (<0.75). (Table VI)
Leukocyte counts in the 34 patients ranged from 1.4 to 3.8 G /L with an average of 2.55 G /L and a median of 2.4 G /L. More than 70% of patients had severe leukopenia with a leukocyte count below 3G /L.
The correlation study between leukocyte count and hemoglobin gave a correlation coefficient: r = 0.20 (<0.75). (Table VII)
The presence of Jolly's body and hypersegmented neutrophils was noted in all patients on blood smears.
In all patients the myelogram showed:
-A rich bone marrow (appearance of blue marrow).
-the erythroblastic line is hyperplastic (60% on average), and megaloblastic.
-the granulocyte / erythroblastic ratio is disturbed.
-the presence of numerous megakaryocytes of large size.
-the presence of giant metamyelocytes (very pathognomonic signs).

Table 1: Distribution of patients by age.

Age class	Number of cases	Percentage
1-10	0	0
11-20	2	5,88
21-30	7	20,59
31-40	3	8,82
41-50	3	8,82
51-60	10	29,41
61-70	4	11,77
71-80	4	11,77
81-90	1	2,94

Table 2: The antecedents reported by the study.

antecedents	Number of cases	Percentage
Chronic anemia	8	23,53
Haemorrhage: (gingivorragia + rectorrhagia)	2	5,88
Insulin-dependent diabetes	1	2,94
high blood pressure	1	2,94
Pulmonary embolism	1	2,94
Tumor of the spleen	1	2,94

Table 3: The main reasons for hospitalization.

Reasons for hospitalization	Number of cases	Percentage
Anemic syndrome	15	44,12
Infectious syndrome	2	5,88
Syndrome hemorrhagic	1	2,94
emaciation	1	2,94
Crohn's disease	1	2,94
Neurological disorders (Paresthesia)	1	2,94
Stage III dyspnea	1	2,94

Table 4: Distribution according to hemoglobin level.

hemoglobin (g/dl)	Number of cases	Percentage
1-3	1	2,94
3,1-5	12	35,29
5,1-7	11	32,35
7,1-10	10	29,42

Table 5: Distribution of mean cell volume levels.

mean cell volume (fl)	Number of cases	Percentage
70-80	2	5,89
80-90	4	11,76
90-100	6	17,65
100-110	6	17,65
110-120	4	11,76
120-130	8	23,53
130-140	3	8,82
140-150	1	2,94

Table 6: Distribution according to platelet count.

Platelet count (G /L)	Number of cases	Percentage
<25	8	23,53
[25, 50]	7	20,59
]50-75]	7	20,59
]75-100]	3	8,82
]100-150]	9	26,47

Table 7: Distribution according to the Leukocyte count.

Leukocyte count (G / l)	Number of cases	Percentage
[0,5- 1]	0	0
]1- 2]	9	26,47
]2- 3]	15	44,12
]3- 4[	10	29,41

Table 8: The prevalence of pancytopenia associated with megaloblastosis compared with to other etiologies. [1, 6, 7]

Study	Year	Country	Number of cases of pancytopenia	First etiology	Second etiology
Tilak.V and Jain.R	1998	Inde	77	megaloblastic Anemia 68%	Myelosuppression 7,7%
Savage.DG and al	1999	Zimbabwe	134	megaloblastic Anemia	Myelosuppression
R.Kumar and al	2001	Inde	166	Myelosuppression 29,51%	megaloblastic Anemia 22,3%
O. Ishtiaq and al	2002	Pakistan	100	megaloblastic Anemia 39%	hypersplenism 19%
Mussarrat niazi and al	2004	Pakistan	89	Myelosuppression 35,95%	megaloblastic Anemia 27,7%
Mobina ahsan Dolhy and al	2005	Pakistan	392	megaloblastic Anemia 35,95%	hypersplenism 16 ,3%
Fazlur ahim and al	2005	Pakistan	424	megaloblastic Anemia 24,92%	Myelosuppression 14,15%
Gayathri BN And kadam S.R	2005-2007	Inde	104	megaloblastic Anemia 74,04%	Myelosuppression 18,26%
Shazia Memon and al	2008	Pakistan	230	Myelosuppression 23,9%	megaloblastic Anemia 13,04%
Prahu.	2009	Inde	100	megaloblastic Anemia 33%	nutritional Anemia 16%
Ninad.S and al	2007-2009	Inde	164	megaloblastic Anemia (22%)	Hypersplenism (15,8%)
Our study	2006-2010	Maroc	112	megaloblastic Anemia (30,36%)	Acute leukemia (17,86%)

Table 9: Main parameters of the hemogram reported by different studies. [1, 8, 9, 10].

	Jha and al	Kumar and al	C. Lavigne and al	Our study
Hemoglobin (g/dl)	6,2	4,6	4,7	6,11
Platelets (G/l)	50	76	46,5	58,78
leukocytes (G/l)	2,6	2,8	2,02	2,55

DISCUSSION

At the end of this study, the main cause of pancytopenia is megaloblastic deficiency anemia (30.36%), followed by acute myeloid or lymphoid leukemia (17.86%). Many studies have been done to determine the prevalence of pancytopenia associated with megaloblastosis compared to other etiologies:

Megaloblastic anemia is the leading cause of pancytopenia found by many authors followed by bone marrow suppression [2, 3, 4]. (Table VIII)

Our study confirms this finding with the prevalence of megaloblastic anemia. The predominance of the deficiency etiology in our study can be explained by the Moroccan diet based on the wide consumption of cereals, especially wheat, limited consumption of food of animal origin [5] and prolonged cooking of meat. It can also be explained by the underestimation of vitamin B12 deficiency. and the lack of approaches to early detection or additional treatment routinely to all high-risk individuals.

However, patients tend not to follow the treatment because of non-adherence or lack of resources.

In our study 85, 29% of the patients had a hemoglobin level higher than 4g /dl, while a study in Djibouti showed that hemoglobin levels below 4g / dl were found in 90% of patients. The deficient pancytopenia do not always associate with macrocytosis, which can be explained by the association with undiagnosed iron deficiency, or hemoglobinopathy. 20 patients (58.82%) with a hemoglobin level of less than 7 g / dl and a mean corpuscular volume greater than 100 µl. However, the correlation study between hemoglobin and mean cell volume levels by the Pearson test gave r = -0.38 (> -0.75). Therefore the correlation between the two variables is not significant. The study of changes in platelet levels as a function of hemoglobin levels showed: for hemoglobin levels below 4 g /dl, the mean platelet count is about 53G /l; for hemoglobin levels between 4 and 7 g /dl, the average platelet count is about 57 G /l and a mean platelet count of 65 G /L is reported for hemoglobin levels greater than 7 g /dl. However, the correlation coefficient obtained by the Pearson test is r = 0.21 (<0.75), that is, the correlation is not statically significant.

The myelograms of all patients with a deficient pancytopenia showed: a rich and blue bone marrow because of the presence of a high level of erythroblasts (70 to 80%), precursors with intensely basophilic cytoplasm; megaloblasts (giant erythroblasts) characterized by asynchronous nucleo-cytoplasmic maturation; and metamyelocytes, myelocytes and megakaryocytes of large size. These signs of dysmyelopoiesis are the consequence of DNA synthesis disorders, caused by a profound vitamin B12 and / or B9 deficiency.

CONCLUSION

Pancytopenias are relatively frequent in the Hematology Department of HMIMV Rabat, 112 cases collected in 5 years. They present a very wide etiological picture with a predominance of the etiology of deficiency. The realization of the myelogram and / or the vitamin dosage remains essential for the establishment of the diagnosis of the deficient pancytopenia, because neither criteria such as macrocytosis, depth of anemia or thrombocytopenia, neither the clinical elements are sufficient to predict a cause.

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