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Monoclonal gammapathies: Epidemiological, immunochemical and etiological analysis of a series of 50 cases

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Abstract

During the period from September 2022 to January 2023, 50 cases of monoclonal gammopathy (GM) were collected at the Avicenne military hospital in Marrakech. The average age of the patients was 62 years. Thirty patients were male and 20 were female. The etiological diagnosis could be established for the 50 observations: 5 were classified as GM of undetermined significance (GMSI), 42 were classified as myeloma, two case of Waldenström's disease and one case of AL amyloidosis. The clinical symptomatology was dominated by bone pain in 78% of patients with a deterioration in general condition in 43%. The most frequently found biological abnormalities were anemia in 62% of patients, renal failure in 48% of patients and 19% had hypercalcemia. A monoclonal peak was found in the electrophoreses of 45 patients (90%), of whom 6 migrated to the beta zone and 39 migrated to the gamma zone. The IgG Kappa isotype was the most frequent with a rate of 56%, followed by IgG Lambda (27%), IgA Kappa (8%), IgA Lambda (3%), IgM Lambda (3%) and lambda free light chains (3%).

Keywords: Monoclonal gammopathy; Diagnosis; Epidemiology; Multiple myeloma

1. Introduction

A monoclonal gammopathy (MG) is defined by the presence in the serum and/or urine of an immunoglobulin (Ig) characterized by a single type of heavy chain H and a single type of light chain L; this Ig is sometimes incomplete, represented only by its H or L chain. GM constitute a very heterogeneous group of diseases. The main problem when faced with a GM is to establish the etiological diagnosis [1,2]. Indeed, GM can be classified into two groups: on the one hand, malignant monoclonal gammopathies (MMG) consisting essentially of myeloma, Waldenström's disease, heavy chain diseases, amyloidosis and other chronic lymphoproliferative syndromes B. On the other hand, monoclonal gammopathies of undetermined significance (MGSI) associated with certain known benign or malignant pathologies [1,2]. In this work, we propose to study the epidemiological, immunochemical and etiological characteristics of a series of 50 cases of GM collected within the Avicenne military hospital in Marrakech.

2. Material and methods

This is a prospective descriptive study of all cases of GM diagnosed in the biochemistry laboratory of the Avicenne military hospital in Marrakech, during a period of 05 months from September 2022 to January 2023. For each sample, serum protein electrophoresis (EPP) and immunotyping (IT) were carried out in the laboratory on the Capillarys 3 Octa machine from Sebia ®. For each patient, an analysis of the medical record is carried out to collect the epidemiological characteristics of the patients and the elements of the etiological diagnosis.

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3. Results

Epidemiological characteristics of patients: During the study period, 50 cases of monoclonal gammopathy (GM) were collected at the Avicenne military hospital in Marrakech. The mean age of the patients was 62 years. Thirty patients were male and 20 were female with a sex ratio M/F of 1.5.

Distribution of patients across hospital departments: During this period, 80% of patients were hospitalized in the clinical hematology department, 14.28% in the nephrology department, and 5.72% in the cardiology department.

Clinical and paraclinical characteristics: The clinical symptomatology was dominated by bone pain in 78% of patients with a deterioration in general condition in 43%. The most frequently found biological abnormalities were normochromic normocytic anemia in 62% of patients with a mean hemoglobin level of 9.4 g/dl, chronic renal failure in 48% of patients with a glomerular filtration rate (GFR) less than 56 ml/min/1.73 m2. The mean GFR value was 62 ml/min/1.73 m2 ±32.5. Hypercalcemia was found in 19% of patients with a mean serum calcium of 90 mg/l ± 11. The mean values of protein and albumin levels in 99 patients were 89.61 g/l ± 23.40 and 32.68 g/l ± 7.47, respectively.

Etiological diagnosis: Among the 50 observations, 45 were classified as malignant GM (MMG) or 90% and 5 (10%) were classified as GM of undetermined significance (GMSI). Table 1 shows the distribution according to the type of malignant haemopathy of the GMM. We note the strong predominance of multiple myeloma which alone represents more than 90% of cases.

Table 1 Etiological distribution of GMM

Etiology	**Number**	**Percentage**
Multiple myeloma	42	93 %
Waldenstrom's disease	2	4.7 %
Amyloidosis AL	1	2.3 %
total	45	100 %

Table 2 Serum EPP results

	Pic Beta		**Pic Gamma**	
	Number	**Percentage**	**Number**	**Percentage**
GMSI	1	20%	4	80%
GMM	5	12.5%	35	87.5%
Total	6	13.33%	39	86.67%

Table 3 Isotypic distribution of GM

	Number	**Percentage**	**Kappa**	**Lambda**
IgG	32	71.42%	21	11
IgA	9	19.06%	7	2
IgM	2	4.76%	0	2
IgE	0	0	0	0
IgD	0	0	0	0
Free light chain	2	4.76%	0	2
Total	45	100%	28	17

Immunochemical characteristics: A peak in the EPP was noted in only 45 patients or 84%. This peak was located in the beta zone in 6 patients (13.33%) and in the gamma zone in 39 patients (86.67%). Table 2 represents the results of serum EPP according to the etiological group of gammopathy. The isotype distribution of GM in our series is presented in Table 3. We can note the predominance of the IgG isotype which represents more than half of the cases, followed by the IgA isotype.

4. Discussion

The average age of patients in our series was around 62 years, indicating that GM are diseases of the elderly. Moreover, different studies have shown that the average age of patients at the time of diagnosis of GM is 68 years, and that 99% of patients diagnosed were over 40 years old [1,2]. Monoclonal gammopathies affect more men than women. The male predominance noted in different series in the literature was verified in our series. [3,4,5]. The EPP did not show a peak in 6% of patients, this indicates the insufficient sensitivity of the EPP for the detection of GM, in particular light chain and heavy chain GMM and transient benign GM with a low serum level of monoclonal Ig. Hence the interest in associating it with other more sensitive techniques such as immunofixation of serum and urinary proteins and the dosage of free light chains. For the 45 cases presenting a peak in the EPP, this was most often of the gamma type, more rarely of the beta type. Concerning the isotype distribution, the preponderant place occupied by IgG in our series is also found in different series. [1,2]

Normocytic normochromic anemia was found in 62% of patients with a mean hemoglobin value of 9.4 g/dl and chronic renal failure in 48% of patients. Indeed, most of our patients were diagnosed at a late stage, which is the multiple myeloma stage often associated with anemia at diagnosis. The mechanism of anemia is multifactorial, in fact, it can occur following direct infiltration of the bone marrow by myeloma cells, inhibition of erythropoiesis, or following an erythropoietin deficiency observed in patients with renal failure, which could explain a higher frequency of anemia in our patients.

Our population was characterized by a significant number of multiple myelomas compared to international studies, this is due to the delay in diagnosis, and that the requests for electrophoresis and immunofixations are not systematic in Morocco. Indeed, the percentage of multiple myelomas at diagnosis was 93% against 12.1% in the French study of Decaux et al in Blois [6,7], 14.6% in the study of Tammimi et al [7]. But Moroccan and Tunisian studies have collected high percentages of multiple myeloma at diagnosis, thus Ouzzif et al [8] found a percentage of MM of 52.77%, Messedi et al [9] in Tunisia found a percentage of 59.26%. The prevalence of GMSI in our cohort was low (10%), due to the lack of screening techniques for monoclonal gammopathies and that our patients were diagnosed at late stages. In the French study of Decaux in Blois, the percentage of GMSI was 77.6%. Another study from Saudi Arabia by Tamimi et al the percentage of GMSI was 68% [8,9]. The low frequency of Waldenström's disease in our series (4.7%) is found in most literature series. [6,7,8,9].

5. Conclusion

The results of our series confirm that GM are pathologies of the elderly with a certain male predominance. The absence of a monoclonal peak on protein electrophoresis should not necessarily rule out the diagnosis of GM.

The diagnoses retained were characterized by a significant percentage of multiple myeloma at diagnosis in comparison with international studies. Similarly, a very low percentage of monoclonal gammopathies of undetermined significance 10% (n = 5), which reflects a delay in diagnosis. Hence, the recommendation of the generalization of requests for serum protein electrophoresis especially in people with major risk factors such as men over 50 years old.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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