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Case Report

Multiple myeloma in a 27-year-old: A rare presentation with cutaneous involvement and literature insights

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Abstract

Multiple myeloma (MM) is a hematological malignancy marked by the abnormal proliferation of plasma cells that invade the bone marrow and, in most cases, secrete a monoclonal protein. While typically diagnosed in older individuals with an average age of 70, MM is rarely observed in young adults. Here, we present a unique case of MM in a 27-year-old man with nodular lesions on the trunk, histologically confirmed as cutaneous MM. Laboratory investigations revealed acute renal impairment, hypercalcemia, and the presence of IgG-Lambda paraprotein. The myelogram confirmed plasmacytosis in more than 12% of the bone marrow mononuclear cells. This case highlights the relevance of considering MM in the differential diagnosis of young patients with unusual cutaneous manifestations.

Keywords: Multiple myeloma, paraproteins, renal insufficiency, skin diseases

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MM is a malignant plasma cell condition representing around 1% of all cancer cases and approximately 10% of all hematologic malignancies [1]. The clinical manifestations of the disease are caused by the malignant cells, monoclonal protein, or cytokines produced by the malignant cells. The acronym "CRAB" briefly summarizes the principal symptoms and complications: "C" denotes hypercalcemia, "R" renal failure, "A" anemia, and "B" is a bone lesion [2]. Skin infiltration is rarely observed. The median age at which MM is diagnosed is approximately 70 years old, and less than 2% of patients are diagnosed before the age of 40 [3]. The present case, which we describe, is a rare case of MM in a 27-year-old young man with skin involvement.

Case Report

A 27-year-old male reported acute and intense left lower limb pain that lasted three weeks, as well as low back pain, epistaxis, asthenia, loss of appetite, and weight loss. A physical examination of his trunk revealed multiple asymptomatic nodular lesions.

Results

During the initial appointment, routine laboratory tests revealed acute renal impairment (creatinine: 4.96 mg/dL, urea: 178 mg/dL), hypercalcemia (11.60 mg/dL), moderate normochromic normocytic anemia (10.3 g/dL), and elevated C-reactive protein (7.4 mg/dL). Urinalysis showed hematuria (12,000/mL) and leukocyturia (3,000/mL). The left knee X-ray revealed the existence of numerous osteolytic lesions on the lower extremity of the femur. Subsequently, the patient underwent hemodialysis to address the acute renal failure, antibiotic therapy was initiated to manage any underlying infection, and a complete investigation for MM was then performed. Serum protein

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electrophoresis found a monoclonal peak in the gamma globulin fraction (Fig. 1). The serum immunofixation assay identified the monoclonality of the IgG-Lambda isotype. Urine immunofixation showed a monoclonal IgG-Lambda band and an excess of monoclonal free lambda light chains. Serum free light chain (sFLC) assay revealed increased excretion of monoclonal lambda light chains >1026.98 mg/dL (normal: 122–437 mg/dL) and a Kappa/lambda ratio <0.05 (normal: 1.30–2.61). Serum β2 microglobulin levels were high at 10,520 ng/mL (normal: 970–2640 ng/mL) with normal lactate dehydrogenase (LDH) levels. Table 1 summarizes laboratory test results obtained at the initial assessment. The myelogram revealed plasmacytosis in more than 12% of the bone marrow mononuclear cells. A whole-body low-dose CT scan was performed, which revealed multiple osteolytic lesions of the axial and peripheral skeleton. A cutaneous nodule biopsy revealed an infiltrate of clonal plasma cells expressing CD138, CD56, lambda light chain, and Ki67 (95%) in immunohistochemistry, indicating cutaneous involvement of the patient's MM. The bone marrow biopsy results are shown in Figure 2. Once the patient's renal function improved, he was scheduled to see an oncologist.

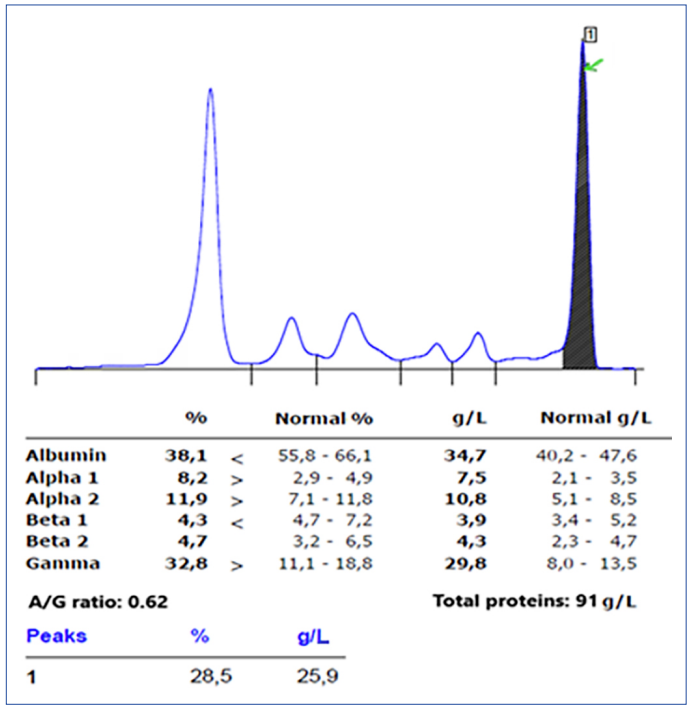

Figure 1. Gamma globulin peak on serum protein electrophoresis. A/G ratio: Albumin/globulin ratio.

Discussion

MM is a clonal B-cell malignancy that affects terminally differentiated plasma cells and is the second most prevalent hematological malignancy after non-Hodgkin lymphoma [4]. M protein, which can be present as intact immunoglobulin or light chain alone, is a key disease characteristic. MM is most common among the elderly, with the peak incidence occurring in the seventh decade of life [5]. A small percentage of MM are identified before age 40 (around 2%) or younger than 30 (0.3%) [6]. Due to their uncommon occurrence, the clinicopathological characteristics and prognosis of early-onset MM patients remain unclear. The limited evidence available in this field primarily consists of individual case reports or small series [6, 7].

While most studies suggest that the clinical and laboratory features of younger individuals with MM resemble those reported in the general MM patient population, some investigations have reported a higher prevalence of osteolytic lesions and light chain myeloma in younger patients than their older counterparts [8].

For most MM patients, plasma cell growth is primarily confined to the bone marrow. However, some MM patients develop extramedullary myeloma, characterized by the growth of clonal plasma cells outside the bone marrow (skin, muscle, pleura, lymph nodes, liver, and the central nervous system). Cutaneous involvement is a rare occurrence in MM, with an incidence of 1.14%, and often indicates a high tumor load, poor prognosis, and late stages of the disease [9]. This extramedullary spread in MM is caused by the downregulation of chemokine receptors and adhesion molecules, allowing plasma cells to evade the bone marrow microenvironment [10]. This is associated with high-risk genetics, accelerated proliferation, apoptosis escaping, and treatment resistance [11]. Histology is crucial in distinguishing between cutaneous MM,

Table 1. Summary of laboratory test results

Laboratory test	Result	Reference value
Creatinine (mg/dL)	4.96	0.72–1.25
Urea (mg/dL)	178	15–45
Calcium (mg/dL)	11.6	8.4–10.2
Hemoglobin (g/dL)	10.3	13–18
MCV (fL)	81	80–98
MCH (pg)	28.9	27–32
Hematocrit (%)	28.9	40–54
C-reactive protein (mg/dL)	7.4	<0.5
sFLC		
Kappa (mg/dL)	52.4	122–437
Lambda (mg/dL)	>1027	62–231
Kappa/Lambda ratio	<0.05	1.30–2.61
Serum β2 microglobulin (ng/mL)	10520	970–2640
Urine β2 microglobulin (ng/mL)	390	<320
LDH (U/L)	174	125–243
Albumin (mg/dL)	3500	3500–5000
Total proteins (mg/dL)	9100	6000–7800
Uric acid (mg/dL)	10.2	3.5–7.2
IgG (mg/dL)	5308	540–1822
IgA (mg/dL)	78	63–484
IgM (mg/dL)	43	22–240

MCV: Mean corpuscular volume; MCH: Mean corpuscular hemoglobin; sFLC: Serum free light chains; LDH: Lactate dehydrogenase; IgG: Immunoglobulin G; IgA: Immunoglobulin A; IgM: Immunoglobulin M.

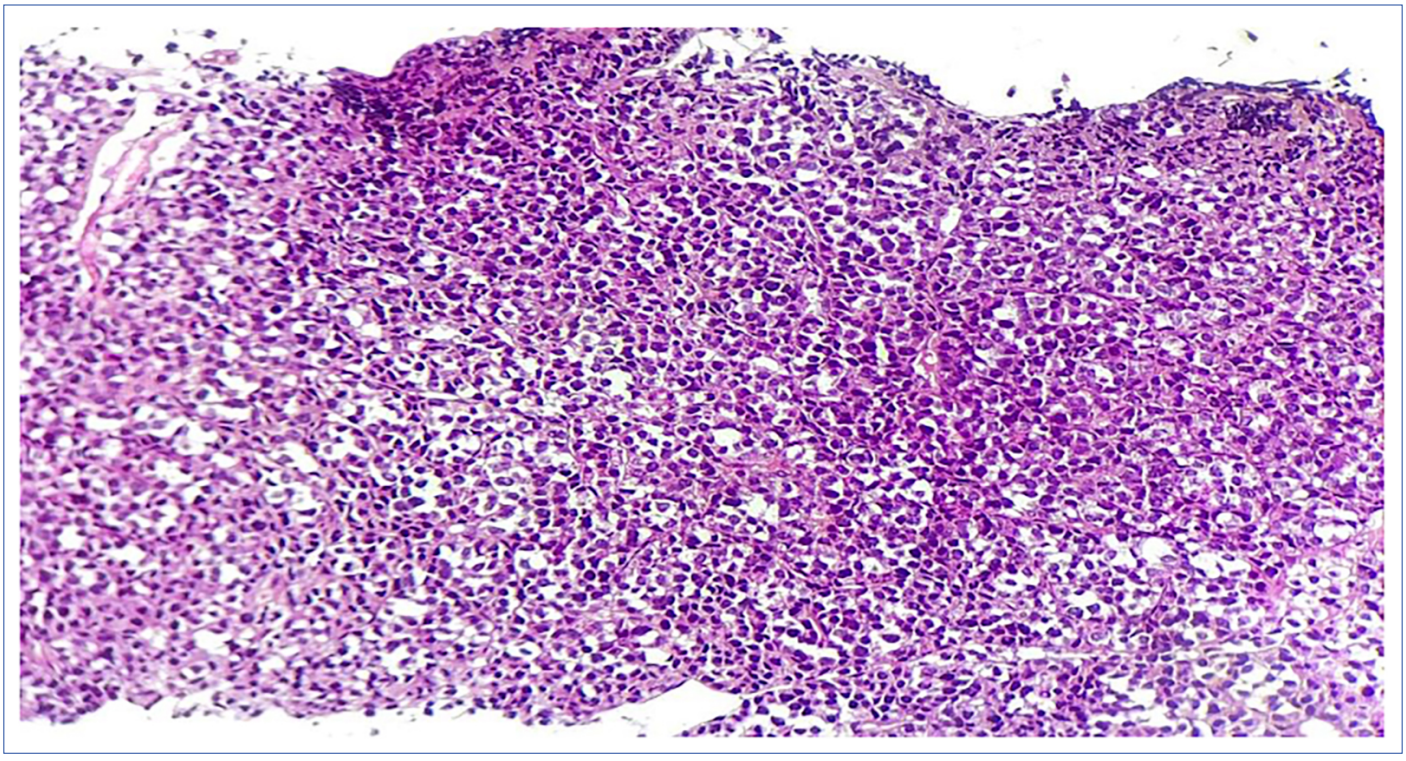

Figure 2. Bone marrow biopsy showing a diffuse proliferation of atypical plasma cells (HES, ×100).
HES: Hematoxylin-eosin-saffron stain.

skin infections, and paraneoplastic conditions, including skin light chain amyloidosis (AL) and scleromyxedema.

The survival rates of MM patients have lately improved considerably as a result of novel therapy techniques that include proteasome inhibitors, immunomodulatory treatments, monoclonal antibodies, and stem cell transplantation. However, MM is still considered an incurable disease, with remissions and relapses marking its clinical course. This inability to successfully cure MM suggests the presence of atypical drug-resistant MM cells and significant intra-tumor heterogeneity [12]. Despite continued progress in treating MM, there is still no clear, recognized therapy protocol for young MM patients. Moreover, identifying optimal treatment alternatives becomes critical for these populations to improve long-term outcomes while minimizing the burden of treatment-related toxicities.

Yet, active therapy for young adults with MM should be started as rapidly as possible, according to the criteria specified by the International Myeloma Working Group (IMWG). The treatment approach for cutaneous manifestations focuses on targeting the underlying MM, local radiation therapy, and surgical excision of the skin lesions if needed [13]. Moreover, while allogeneic transplantation remains an option for young patients with high risk, it should still be regarded as experimental and considered only if a suitable donor is available. New approaches include bone-targeting drugs, monoclonal antibodies (Isatuximab, Elotuzumab, anti-BCMA), vaccinations, cellular therapy, and other targeted drugs, which may enlarge the therapeutic armamentarium for managing early-onset MM [14, 15].

Conclusion

MM in young adults is uncommon, although it does exist. When young adults present to healthcare professionals, they may exhibit symptoms of MM similar to those seen in older patients or more rare manifestations, such as skin symptoms, as observed in our patient. Even so, MM must be considered early in the differential diagnosis.

Despite the recent introduction of several novel therapies, there is still a lack of curative therapy alternatives for young MM patients. A better understanding of disease behavior in this specific group of patients requires prospective multicentric studies, potentially recognizing this group as a distinct biological and clinical entity.

Informed Consent: Written informed consent was obtained from the patient for the publication of the case report and the accompanying images.

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