# Multiple myeloma in a young adult. A case report

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Case Report

Hematology

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**Background:**
Introduction: Multiple myeloma (MM) is an incurable, biologically heterogeneous disease of plasma cells. It is characterized by clonal proliferation of malignant plasma cells, predominantly affecting the bone marrow microenvironment and skeletal system. MM is considered a disease of the elderly, as most cases are diagnosed at a median age of 69 years. Less than 2% of patients diagnosed with MM are younger than 40 years of age. Case report: A 32-year-old male patient with a family history of multiple myeloma, with wasting syndrome of 7 months of evolution and who presented pathological fracture of the L2 vertebra; chest Computed Tomography (CT) scan showed multiple osteolytic lesions in spinal column, and the laboratory findings showed anemia, renal insufficiency, hyperphosphatemia and hypercalcemia and the serum protein electrophoresis positive for hypergammaglobulinemia, suspecting hematological neoplasia; the histopathological study confirmed a multiple myeloma. Conclusion: In Mexico, the statistics of this type of disease have been deficient, however, this diagnosis must be considered even at young age, since timely treatment reduces morbidity and mortality of these patients, favoring their prognosis.

**Keywords:** Multiple Myeloma, Bone Disease, Cytogenetics, Oncology, Young Adults

Multiple myeloma evolves from a clinically silent premalignant stage termed monoclonal gammopathy of undetermined significance (MGUS). MGUS is a classic premalignant condition with a low risk of malignant conversion and progresses to MM at rate of 1% per year. In some patients, an intermediate asymptomatic but more advanced premalignant stage termed smoldering (or indolent) MM (SMM). SMM progress to myeloma at a rate of 10% year.[1,2] Black people are affected twice as commonly as white people, and males more than females. The median age for diagnosis is 65 years, with fewer than 3% of patients presenting when they are younger than 40 years.[3]
We report in this article the case of a 32-year-old male patient who had a clinical presentation compatible with MM.

## Case report

The case was a 32-year-old male patient with a family history of MM, resident of an industrial area. He denied consumption of alcohol, tobacco or narcotics. Among his personal pathological history, he suffered from systemic arterial hypertension for one month of detection in treatment with angiotensin II receptor blockers. He reported suffering a weight loss of 20 kg in the last 6 months and the presence of musculoskeletal pain associated with wasting syndrome. In February 2023, he presented a pathological fracture of the L2 vertebra requiring segmentation surgery. In March 2023 with the presence of nausea reaching emesis on multiple occasions of bile content and respiratory distress with 76% pulse oximetry, which is why he went to a private center where a chest CT scan was requested, and osteolytic lesions were evidenced. So, it is sent to the MD Jose Luis Barrera Franco State Oncology Center for study protocol.

A physical examination with preserved mental functions, spontaneous language, normal tone and volume, emits, repeats, nominates. Calculation, abstraction and judgment preserved; attention and attention span preserved. Cardiopulmonary auscultation without alterations. Lower extremities with edema +/+++. Her blood pressure was 129/85 mmHg, heart rate 103 beats/minute, respiratory rate 18 breaths/minute, oxygen saturation 98% with supplemental oxygen support, weight 68 kg. Chest CT scan showed multiple osteolytic lesions in spinal column (**Figure 1**). At biological assessment, he had urea concentrations at 58 mg/dL, ureic nitrogen at 27 mg/dL, serum creatinine at 2.8 mg/dL, serum calcium at 10.7 mg/dL, serum phosphorus at 1.7 mg/dL, serum sodium at 124 mg/dL, serum potassium at 3.3 mg/dL,

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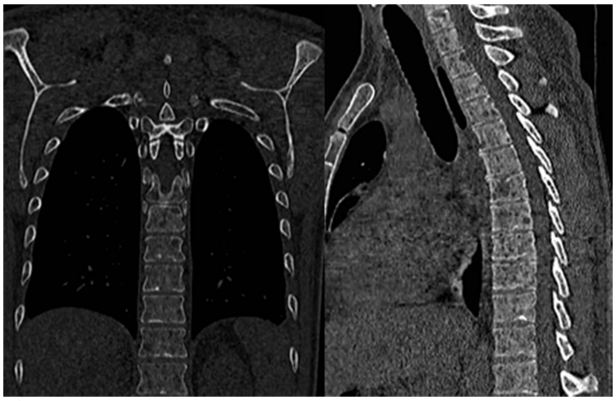

**Figure 1.** Chest CT scan with multiple osteolytic lesions in spinal column.

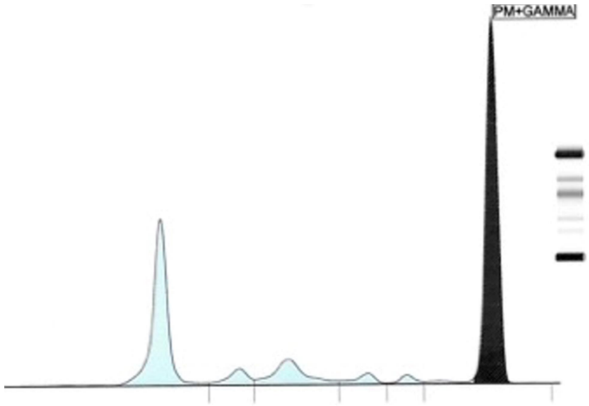


**Figure 2.** Presence of immunoglobulin G Kappa monoclonal component in the gamma zone.

serum chlorine at 100 mg/dL, hemoglobin at 10.7 g/dL, hematocrit at 31.2%, platelets at 149,000, leukocytes at 3,970, neutrophils at 2,520, β2-microglobulin at 22.97 µg/mL, immunoglobulin G at 5,670 mg/dL, immunoglobulin M at 150 mg/dL, immunoglobulin A at 200 mg/dL, lactate dehydrogenase at 255 U/L, for which he met the criteria essential for the diagnosis of myeloma. At serum protein electrophoresis: monoclonal peak in gamma position (**Figure 2**). At serum immunoelectrophoretic profile, the presence of a monoclonal gammopathy type immunoglobulin G Kappa (**Figure 3**).

As part of the protocol, a bone marrow aspirate was performed with hematoxylin and eosin staining, where 80% of plasma cells were found (**Figure 4**), immunohistochemistry revealed a positive immunoreaction for Kappa light chains (**Figure 5**) and Interphase Fluorescent in Situ Hybridization (FISH) result positive for gain from 1q21, monosomy 13 and gain from chromosome 15, thus confirming the diagnosis of Revised International Staging System (R-ISS) stage I, immunoglobulin G Kappa multiple myeloma.

At this time, treatment was started with

| MARKER | RESULT |
|---|---|
| CD19 | Negative |
| CD27 | Negative in 78% of the population |
| CD38 | ++ |
| CD45 | Negative |
| CD56 | ++ Heterogeneous |
| CD81 | Negative in 81% of the population |
| CD117 | Negative |
| CD138 | + Heterogeneous |
| cylg κ | + |
| cylg λ | Negative |

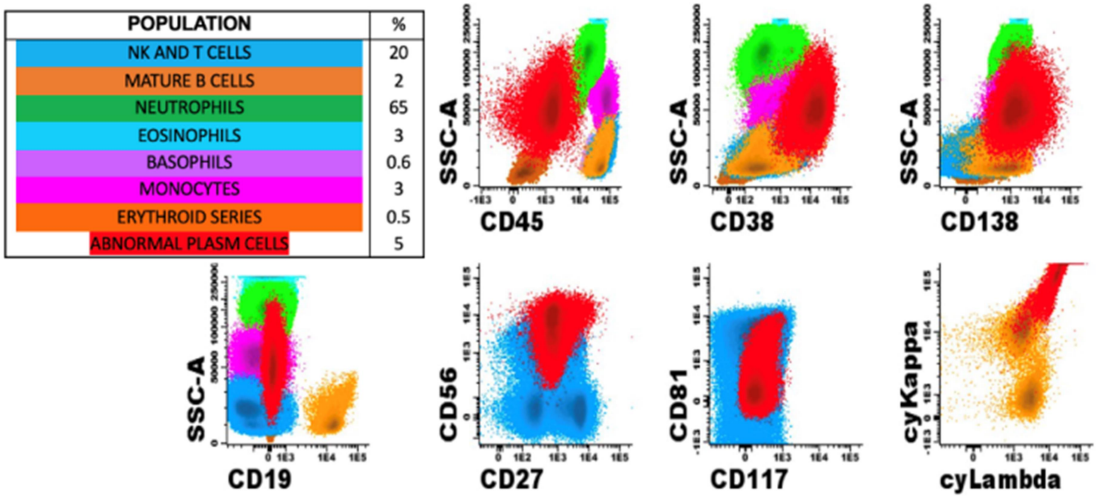


**Figure 3.** A population of cells (red) was detected that represents 5% of the total events analyzed, of greater size and complexity than that of residual T lymphocytes. This population is consistent with phenotypically abnormal kappa light chain-restriced plasma cells.


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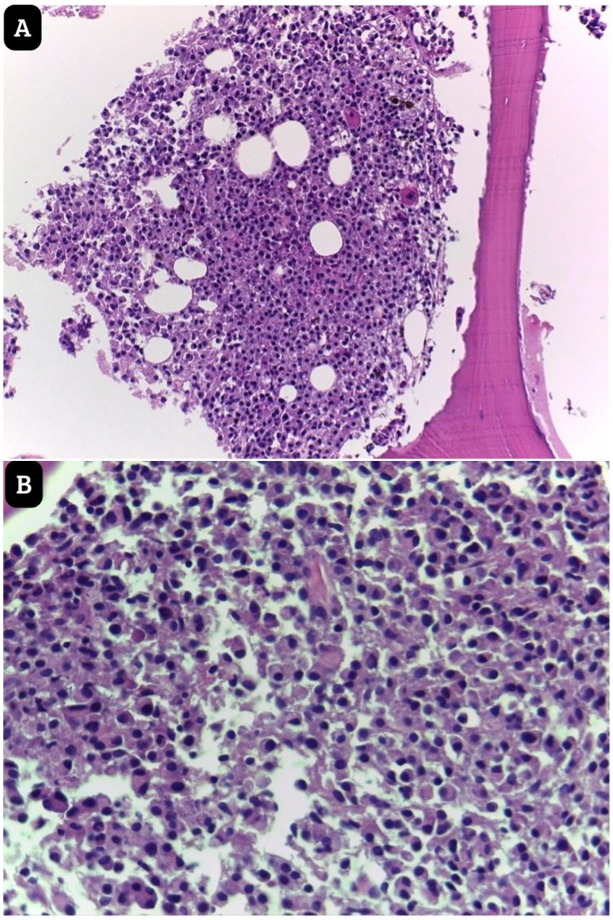


**Figure 4.** (A) Microscopic photograph at 20X showing a paratrabecular space with a predominance of up to 80% of plasma cells, most of them mononucleated with a normal appearance. (B) Microscopic photograph at 40X showing a conglomerate of plasma cells showing variation in cell shape and size with some binucleate forms.

dexamethasone 40 mg intravenously every 24 hours. Subsequently, carfilzomib 100 mg intravenously and lenalidomide 25 mg intravenously were added, clinically presenting relief of the symptoms referred to at the onset of the symptoms. The ambulation began without difficulties.

The patient was discharged from the hospital with an appointment in the outpatient clinic for follow-up.

## Discussion

MM is the second most common hematologic malignancy in the United States after non-Hodgkin lymphoma with an approximate annual incidence of 32,110 patients, with slight male predominance (1.3:1).[4] The pathogenesis of MM is complex and involves genetic abnormalities, cytokines production, suppressive bone marrow microenvironment, and aberrant signaling pathways.[5] Risk factors for MM include obesity, chronic inflammation, and exposure to pesticides, organic solvents, or radiation.[6]

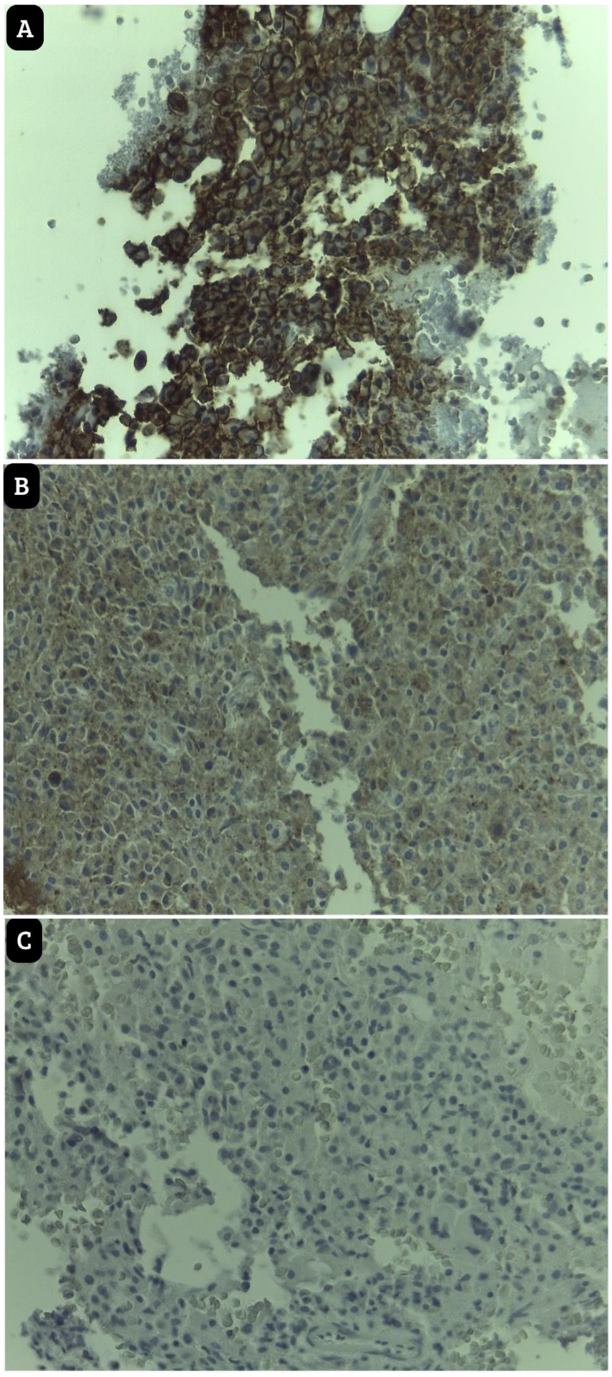


**Figure 5.** (A) Microscopic photograph at 20X showing the immunoreaction for membrane CD138 in abundant plasma cells. (B) Microscopic photograph at 40X showing a positive immunoreaction for Kappa light chains. (C) Microscopic photograph at 40X showing negative immunoreaction for Lambda light chains.

Symptomatic MM is diagnosed using the International Myeloma Working Group criteria as a bone marrow infiltration of ≥ 10% clonal plasma cells, and the presence of at least one or more MM defining events: CRAB (hypercalcemia, renal failure, anemia, or lytic bone lesions) attributable to the plasma cell


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| Stage I | Stage II | Stage III |
|---|---|---|
| ISS stage I (serum β2-microglobulin < 3.5 mg/L, serum albumin > 3.5 g/dL) and<br>No high-risk cytogenetics<br>Normal LDH<br>Data from Palumbo et al., 2015[18] | Neither stage I or III | ISS stage III (serum β2-microglobulin > 5.5 mg/L) and<br>High-risk cytogenetics [t(4;14), t(14;16) or del(17p) or<br>Elevated LDH |

**Table 1.** Revised International Staging System for Myeloma.

disorder, bone marrow clonal plasmacytosis ≥ 60%, a serum involved/uninvolved free light chain ratio of > 100, or more than one bone lesion of > 5 mm on Magnetic Resonance Imaging (MRI).[7,10]

At the time of presentation approximately 73% have anemia, 79% have osteolytic bone disease, and 19% have acute kidney injury. Other symptoms include hypercalcemia (10%-19%) and pathologic fractures (30%).[11,12]

The initial work up for MM should begin with a comprehensive history and physical examination. Basic laboratory tests include complete blood count to assess for cytopenias, renal function, serum calcium, serum albumin, lactic dehydrogenase (LDH) and β2-microglobulin. A serum free light chain levels, serum and urine protein electrophoresis and immunofixation.[13,14] Cytogenetic evaluation is mandatory in all patients and should always include FISH.[15] Imaging, such as CT (without contrast dye due to renal damage), MRI, and Positron Emission Tomography (PET) scans, is used to uncover lytic bone lesions.[16]

The International Staging System (ISS), based on albumin and β2-microglobulin levels, is most widely used, and has been revised to incorporate LDH and high-risk cytogenetic abnormalities[17] (**Table 1**).

Data on the disease course, presenting features, outcomes, and prognosis of younger patients with MM are lacking.[19] Hewell et al. have described the first documented cases of young patients with MM and reported a frequency of 1%.[20] Nakaya et al. retrospectively analyzed data of 3284 patients with plasma cell dyscrasias, 26 patients with symptomatic MM in the Kansai Myeloma Forum between 1998 and 2018 and reported a prevalence in age from 16 to 39 years of 0.8%.[21] Duek et al. analyzed 23 patients at a median age of 41.5 years (range 27-49) and concluded that 79% patients presented at ISS I-II, 89% had high frequency of bone lytic lesions, 45% light chain myeloma and 68% translocation t(11;14).[22]

Advances in therapies (including autologous bone marrow transplantation and novel therapies, such as daratumumab, carfilzomib, ixazomib and elotuzumab) have significantly improved patient outcomes; however, there remains a subset of patients with high-risk disease who have a particularly poor prognosis.[23,24]

## Conclusion

The importance of reporting this case lies in the low prevalence of this disease in a young patient in the medical literature. In Mexico, the statistics of this type of disease have been deficient; however, this diagnosis must be considered even at an early age since it involves the patient's prognosis. The clinical trend of cases in young people has not been fully established up to now because the disease is rare, representing less than 2% in people < 40 years of age. At present, the disease control strategy includes prolonged treatment to ensure what was achieved with the initial chemotherapy. Transplantation from one's own stem cells (autologous transplantation) has a key role in the treatment of this disease, as a way of improving the degree of response achieved with chemotherapy and its duration. Therefore, a differential diagnosis of a serum paraprotein should be performed, as well as a good, targeted questioning and extension tests to establish the correct diagnosis and thus provide timely care to these patients.

## Conflicts of interests

The authors declare no conflicts of interest.

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