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Multiple Myeloma: An Overview

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Commentary

Multiple Myeloma (MM) is a cancer of plasma cells, a kind of white blood cell that normally generates antibodies. It is also known as plasma cell myeloma or simply myeloma. Often, no symptoms are apparent at first. Bone pain, anaemia, kidney dysfunction, and infections may develop as the disease advances. Amyloidosis is one of the possible complications. Multiple myeloma has no recognised aetiology [1]. Obesity, radiation exposure, family history, and some chemicals are all risk factors. Multiple myeloma can arise from an unexplained monoclonal gammopathy that develops to smouldering myeloma.

Aberrant plasma cells produce abnormal antibodies, which can lead to renal issues and blood that is too thick. In the bone marrow or soft tissue, plasma cells can form a mass [2]. A plasmacytoma is a single tumour; multiple myeloma is when there are several tumours. Blood or urine tests that reveal aberrant antibodies, bone marrow biopsy that reveals malignant plasma cells, and medical imaging that reveals bone lesions are all used to diagnose multiple myeloma. High blood calcium levels are another common observation. Multiple myeloma is a cancer that can be treated but is usually fatal. Steroids, chemotherapy, targeted therapy, and stem cell transplant can all help patients achieve remission. To relieve pain from bone lesions, bisphosphonates and radiation therapy are sometimes employed. Multiple myeloma afflicted 488,000 persons worldwide in 2015, with 101,100 fatalities [3]. It affects 6.5 per 100,000 persons in the United States each year, and 0.7 percent of the population is affected at some point in their lives. Men are more likely than women to develop it around the age of 60. It is rare before the age of 40. In the pre-chemotherapy era, the median survival time was roughly 7 months without treatment.

The prognosis improved dramatically after the advent of chemotherapy, with a median survival of 24 to 30 months and a 10-year survival rate of 3%. Prognosis has improved even more as a result of the development of newer biologic medicines and better salvage alternatives, with median survival now exceeding 60 to 90 months. Survival with current therapy is usually 4–5 years. The five-year survival rate is approximately 54%. Myeloma is derived from the Greek words myelo-, which means "marrow," and -oma, which means "tumour." One of the most prevalent symptoms of multiple myeloma is bone pain, which affects about 70% of patients. Myeloma bone pain typically affects the spine and ribs and increases with activity. Persistent, localised pain could be a sign of a pathological bone fracture. Vertebral involvement can cause spinal cord compression or kyphosis [4].

The overexpression of Receptor Activator for Nuclear Factor B Ligand (RANKL) by bone marrow stroma causes myeloma bone disease. RANKL stimulates osteoclasts, which are responsible for bone resorption. The resulting bone lesions are lytic in character (cause breakdown) and are best observed on plain radiographs, which may reveal "punched-out" resorptive lesions (including the "raindrop" appearance of the skull on radiography) [5].

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The breakdown of bone also causes the release of calcium ions into the blood, resulting in hypercalcemia and the symptoms that go with it.

Anemia

Myeloma anaemia is typically normocytic and normochromic. It is caused by tumour cells entering normal bone marrow and cytokines inhibiting normal red blood cell formation (hematopoiesis).

Kidney function impairment

Impaired kidney function can occur acutely or persistently, and to varying degrees of severity. Proteins released by malignant cells are the most common cause of renal failure in multiple myeloma. Myeloma cells produce a variety of monoclonal proteins, the most frequent of which are immunoglobulins (antibodies) and free light chains, resulting in abnormally high quantities of these proteins in the blood. These proteins may be eliminated by the kidneys depending on their size. Proteins and light chains have the potential to harm the kidneys. Increased bone resorption causes hypercalcemia and nephrocalcinosis, both of which contribute to kidney failure. Amyloidosis comes in third place in terms of cause. Amyloidosis is characterised by high quantities of amyloid protein, which can be discharged through the kidneys and cause harm to the kidneys and other organs. Light chains have a variety of impacts, one of which is the Fanconi syndrome (type II kidney tubular acidosis).

Infection

Pneumonia and pyelonephritis are the most prevalent illnesses. Pathogens that cause pneumonia include S. *pneumoniae*, *S. aureus*, and *K. pneumoniae*, whereas pathogens that cause pyelonephritis include *E. coli* and other Gram-negative organisms. The initial few months following the commencement of chemotherapy are the most dangerous for the occurrence of infection. The higher risk of infection is caused by a weakened immune system.

Although overall immunoglobulin levels are often raised in multiple myeloma, the majority of antibodies are useless monoclonal antibodies derived from clonal plasma cells. To lower the risk of infection, a small subset of persons with proven hypogammaglobulinemia may benefit from replacement immunoglobulin therapy.

Symptoms of neurological disease

Anemia or hypercalcemia may cause some symptoms (for example, weakness, disorientation, and exhaustion). Depending on the qualities of the paraprotein, hyperviscosity of the blood may cause headache, visual abnormalities, and retinopathy. Finally, radicular pain, loss of bowel or bladder control (due to spinal cord involvement leading to cord compression) or carpal tunnel syndrome, as well as other neuropathies (due to amyloid infiltration of peripheral nerves) may occur. In late-presenting cases, it may result in paraplegia. When the condition is well-controlled, current treatments may produce neurological symptoms, some of which may cause peripheral neuropathy, which manifests as numbness or discomfort in the hands, feet, and lower legs.

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