

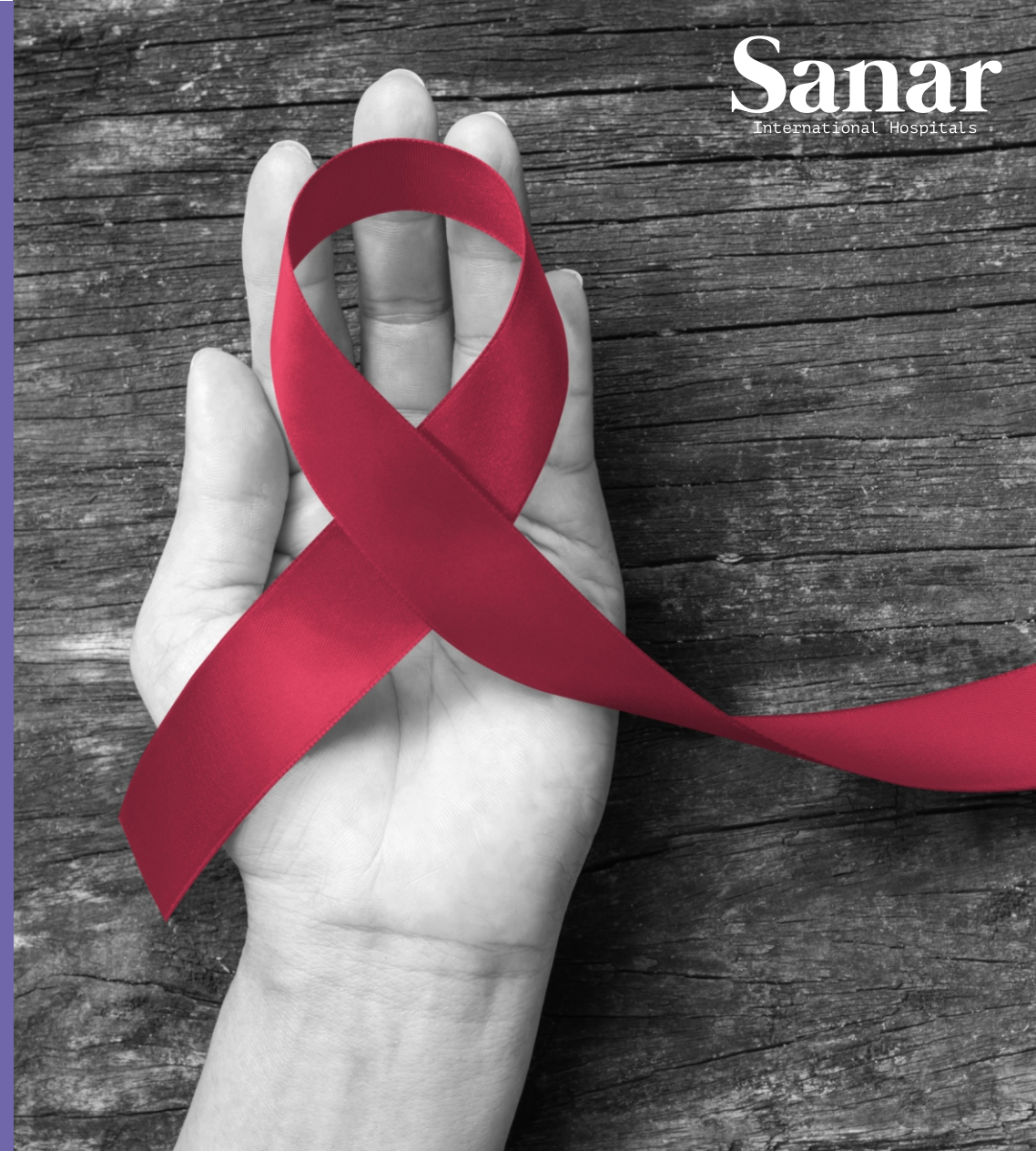
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Understanding
Multiple Myeloma



What is Multiple Myeloma?

Myeloma is a type of Blood Cancer. The cancer involves certain white blood cells called plasma cells. The cancerous plasma cells build up in the bone marrow and make large quantities of one type of Antibody resulting in development of various symptoms. Myeloma is sometimes called Multiple Myeloma or Myelomatosis.

What happens in Multiple Myeloma?

In the case of Multiple Myeloma, one plasma cell at first becomes cancerous. This abnormal cell then multiplies to produce many identical abnormal plasma cells (a clone of cells). The cancerous plasma cells mainly collect in the bone marrow and continue to multiply without any control.

In the vast majority of cases of Multiple Myeloma, the abnormal plasma cells make large quantities of one type of antibody. This single type of antibody is called a Paraprotein (or sometimes called a Monoclonal antibody, as it is an antibody which comes from a single clone of plasma cells).

What causes Multiple Myeloma?

Plasma cells develop from small white blood cells called B lymphocytes. It is believed that as B lymphocytes develop into plasma cells, mistakes occur during the process where the genetic material is copied, leading to the cell becoming cancerous.

The cancerous cell multiplies, leading to the development of Multiple Myeloma, the reason why the genetic mistakes occur is not yet known but they do not appear to be handed down from one generation to the next. The condition is therefore non-hereditary.

Multiple Myeloma Symptoms

There may be no symptoms at first in the early stages of the disease. Some people are diagnosed by chance because they have a blood test done for other reasons which may detect early myeloma. As the disease progresses, symptoms develop.

The symptoms and problems which develop are mainly due to the uncontrolled production of plasma cells in the bone marrow and the excess amount of antibodies (paraprotein) that the plasma cells produce.

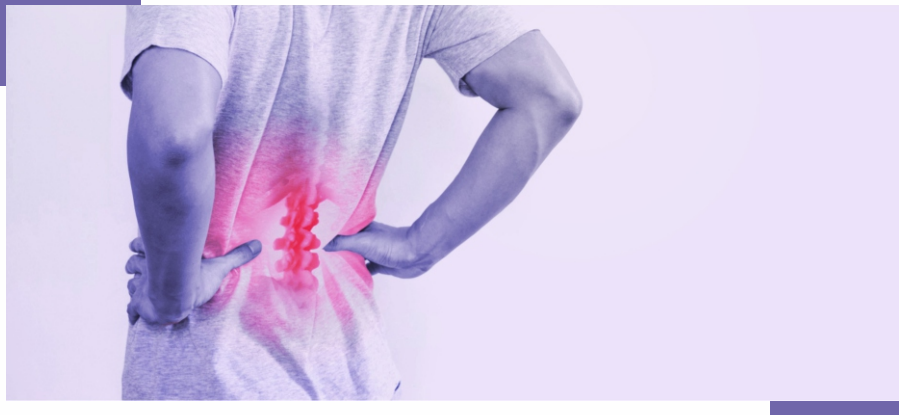


Bone Damage and Related Problems

The increasing number of plasma cells in the bone marrow act like growing tumours (Plasmacytomas) inside the bones. They also make a chemical that can damage the bone. In time, small parts of bone are destroyed and are called Lytic Lesions. The term Multiple Myeloma is sometimes used which means there are multiple areas in bones throughout the body which are affected.

The damage to bone can cause:

Bone pain: This is often the first symptom and can become severe. Any bone can be affected but the most common sites where pain first develops are the lower back, the pelvis and the ribs. The pain tends to be persistent and made worse by movement



Fractures: Affected bones may easily break (fracture) following a mild injury or even no injury

Compression of nerves coming out of the spinal cord: The compression usually happens because of fractures of the bones surrounding the spinal cord (the vertebrae). This can cause a variety of symptoms such as weakness in muscles of the legs, numbness of areas in the body or legs, bladder or bowel problems and pain

Hypercalcaemia: This means a high level of calcium in the blood (due to the bone breaking down). This can:

- Make you very thirsty
- Cause you to feel and be sick (have nausea and vomiting)
- Develop a lack of fluid in the body (dehydration)
- Cause constipation
- Lead to Kidney Damage

Bone Marrow Failure

Much of the bone marrow gets filled with abnormal plasma cells. Because of this, it is difficult for normal cells in the bone marrow to survive and to develop into normal mature blood cells. Therefore, there are multiple problems which can develop due to this condition:

- **Anaemia:** This occurs as the number of red blood cells goes down. This can cause tiredness, breathlessness and other symptoms
- **Blood clotting problems:** This is due to low levels of platelets. This can cause easy bruising, bleeding from the gums and other bleeding-related problems
- **Serious infections:** The abnormal plasma cells only make one type of antibody. This reduces the protection against infection. There is a reduced number of normal plasma cells and other types of white blood cells which usually combat infection. Therefore, serious infections are more likely to develop

Kidney Damage

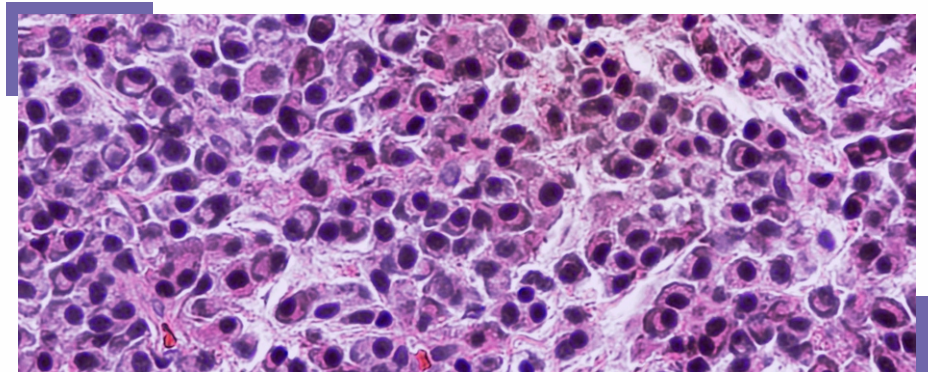
The kidneys may be damaged by an increased calcium level in the bloodstream, and / or by the high level of the abnormal antibody (paraprotein).

Hyperviscosity

This means that the blood may become too thick due to a very high level of paraprotein. Symptoms of hyperviscosity occur in less than one in ten cases of Multiple Myeloma and include problems such as bruising, nosebleeds, hazy vision, headaches, sleepiness and various other symptoms.

Amyloidosis

This is an uncommon complication of Multiple Myeloma, where abnormal protein (amyloid) accumulates in different parts of the body, causing various symptoms.

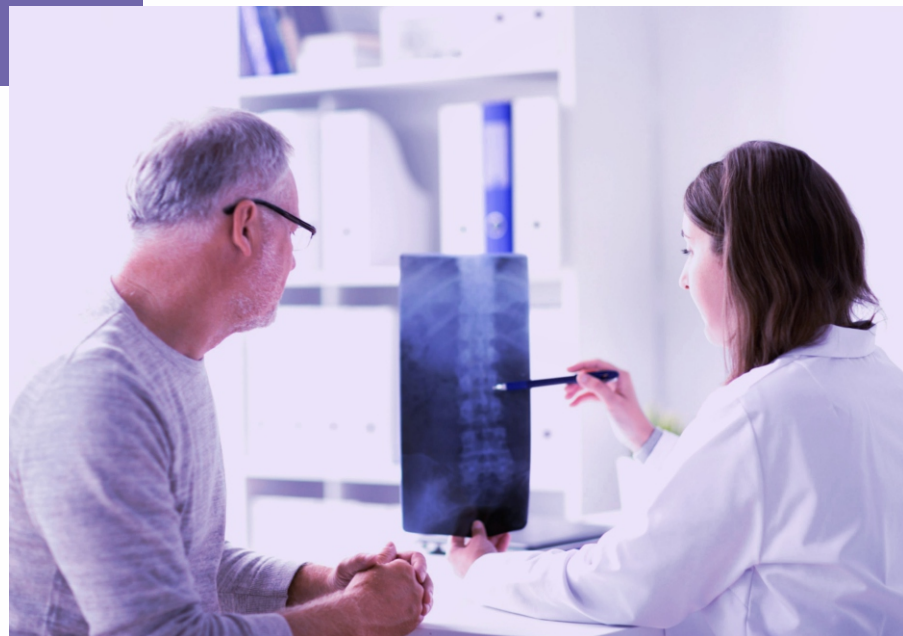


Multiple Myeloma Diagnosis

Tests commonly performed to confirm the diagnosis of Multiple Myeloma include:

- **A blood or urine test to detect the paraprotein** Blood tests are usually performed to ascertain if one is anaemic and to check for the function of the kidneys and the calcium levels
- **A bone marrow sample.** A needle is inserted into the pelvic bone or occasionally the breastbone (sternum), then a small amount of marrow is removed. The sample is placed under the microscope to look for abnormal cells. The diagnosis gets confirmed when large numbers of plasma cells are seen in the bone marrow sample
- **X-rays of bones.** The areas of damaged bones often show up as typical patterns on radiograph. A Magnetic Resonance Imaging (MRI) scan, Computerised Tomography (CT) scan or Ultrasound scan may be done if X-ray tests do not give enough detailed information. Sometimes more specialised scans - for example, a Positron Emission Tomography (PET) scan is also performed

These tests may be repeated from time-to-time to monitor the progress of the disease and consequent response to the treatment.



Assessing the severity of Multiple Myeloma

Tests which are commonly performed to assess the severity of the disease and to monitor the response to treatment include:

- Urine tests to check the kidney function
- Blood tests to check the level of calcium in the blood
- Blood tests to check the level of paraprotein in the blood
- Chromosome and gene testing of the myeloma cells. This can help to identify the exact type of myeloma so that doctors can decide which treatment is best
- Blood tests to measure proteins in the blood, called beta-2 microglobulin and albumin. The levels of these proteins are affected by Multiple Myeloma and give an indication to the severity of the disease

Multiple Myeloma Treatment

Treatment for Multiple Myeloma may include one or more of the following:

- Chemotherapy
- Steroids
- Radiotherapy
- Stem Cell Transplant



Treatments to ease symptoms

Depending on the effects of Multiple Myeloma, one or more of the following may be advised:

- **Pain killers** - to ease any pain
- **Bisphosphonate medicine** - Bisphosphonates are a type of medicine that is used to strengthen the bones. It is now recommended that all patients with symptomatic Multiple Myeloma should take a bisphosphonate medicine
- **Erythropoietin** - This is a hormone that helps to increase the number of red cells made in the bone marrow. It may be used to help improve anaemia
- **Blood transfusions** to correct anaemia
- **Plasma exchange or exchange blood transfusions** if one has a very high level of paraprotein in the blood which is causing hyperviscosity symptoms
- **Antibiotics** If one develops any symptoms of an infection a specialist doctor should be consulted as soon as possible. Some people will need to have intravenous antibiotics in the hospital if they develop an infection



- **Surgery** is sometimes needed to help heal fractured bones or to ease pressure on a compressed nerve due to fractures of the vertebrae
- **Kidney Dialysis** is recommended if one develops Kidney Damage or Kidney Failure

The prognosis is variable and in some cases the disease responds very well to treatment and survival is longer. In particular, a successful Stem Cell Transplant gives a good chance of complete remission. In some cases, the disease does not respond to treatment very well or a life-threatening complication may develop such as Kidney Failure.

