Multiple Myeloma

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Multiple Myeloma
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Underlying Pathophysiology

**Plasma Cell Disease:** Incurable, Heterogeneous
Monoclonal plasma cell proliferation in bone marrow leading to overgrowth (Brigle & Rogers, 2017).

- Followed by increased production of immunoglobulins or immunoglobulin light chains.
- Other cells in bone marrow (Brigle & Rogers, 2017).

Pathophysiology of abnormal plasma cell production:
- Cytoplasmic dysregulation (early event).
- Kappa or Lambda light chain deposition diseases presenting clinical manifestations,
- Manifestations,
- “30,770 newly diagnosed cases of MM in the United States in 2017” (Rigle & Rogers, 2017).

<table>
<thead>
<tr>
<th>Presentation: Multiple Myeloma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasma cell malignancy (plasmacytoma): Multiple plasma cell malignancies in bone marrow and produce an overproduction of monoclonal protein (Michels &amp; Peterson, 2017).</td>
</tr>
<tr>
<td>The normal protein produced (IgG, IgA, IgM) is replaced (rarely).</td>
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<tr>
<td>Kappa or Lambda light chain predominance (epigenetic events).</td>
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<tr>
<td>Caucasian Americans are twice as likely to develop MM compared to African Americans.</td>
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<tr>
<td>African Americans are twice as likely to develop MM compared to Caucasian Americans. African Americans also present earlier and more often in the United States (Michels &amp; Peterson, 2017).</td>
</tr>
</tbody>
</table>

85% of patients diagnosed with MM are alive by 5 years (Michels & Peterson, 2017).

15% of patients diagnosed with MM are alive by 5 years (Michels & Peterson, 2017).

- 65% of patients are alive by median age of diagnosis (Brigle & Rogers, 2017).

- 65% at 4 years survival rate (Brigle & Rogers, 2017).

- 80% of patients require observation for the treatment of multiple myeloma in Table 1. (Michels & Peterson, 2017).

- 80% of patients experience reduced symptoms, pathophysiology, and treatment recommendations (Michels & Peterson, 2017).

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### Table 1. Findings on Presentation for Patients with Multiple Myeloma (Michels & Peterson, 2017)

<table>
<thead>
<tr>
<th>Symptom or Laboratory Finding</th>
<th>Percentage of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sudden onset of back or leg pain</td>
<td>70%</td>
</tr>
<tr>
<td>Bone marrow biopsy (RB and D in per L)</td>
<td>12%</td>
</tr>
<tr>
<td>Bone marrow aspiration</td>
<td>6%</td>
</tr>
<tr>
<td>Elevation of creatinine (η 1.3 mg/dl</td>
<td>40%</td>
</tr>
<tr>
<td>Fatigue or generalized weakness</td>
<td>32%</td>
</tr>
<tr>
<td>Hypercalcemia (calcium &gt; 10.1 mg/dl</td>
<td>32%</td>
</tr>
<tr>
<td>Cushingoid appearance</td>
<td>24%</td>
</tr>
</tbody>
</table>

- **Anemia:** Common with MM: Decrease in hemoglobin levels.
- **Bone lesions:** One or more lesions:
  - Patients with hypercalcemia: Deterioration on radiographic bone lesions.
  - Bone lesions: 2 mg/dl (177 μmol per L) of normal, or abnormal MM.
  - Reduced levels of bone density.

- **Signs & Symptoms**
  - Nausea, vomiting, weakness, fatigue, weight loss, and dehydration.
  - Hypercalcemia, bone pain, renal dysfunction, hyperplastic bone marrow, and bone destruction.

- **Implications for Care**
  - Myeloma chemotherapy using two or more drugs, including alkylating agents, arsenic trioxide, and proteasome inhibitors.
  - Common chemotherapy drugs used: Corticosteroids, thalidomide, lenalidomide, bortezomib, melphalan, and pomalidomide.
  - Alkalizing agents: Alkalinization, anticoagulants: Dextrostil, surgical excision, hyperthermic, and hyperbaric oxygen.
  - Immunomodulatory drugs: Thalidomide, lenalidomide, pomalidomide, proteasome inhibitors.
  - Heavy metal chelation therapy.
  - Special Treatment Considerations:
    - Avoid nephrotoxic medications and studies using contrast media due to renal dysfunction.
  - Acute kidney injury with MM: at least 3 per day of increased normal value in addition to decrease serum level of IL-17.
  - Myeloma-related complications:
    - Bone marrow suppression.
    - Leukemia, lymphoma, and solid tumors.
    - Reference to Figure 1 in the March 2017 American Family Physician Journal Article, Volume 55, Number 11, page 227.

- **Diagnostic Criteria According to Michel and Peterson, 2017:**
  - "Both criteria must be met:
    - (1) Clinical bone marrow plasma cell is 10% or biopsy-proven by extramedullary plasmacytoma.
    - (2) Any one or more of the following myeloma-defining entities: Duration of end-organ damage that can be attributed to the underlying plasma cell dyscrasia.
    - Hypercalcemia: serum calcium ≥ 1 mg per dl or (0.4 mmol per L) more than 11 mg per dl or (≥ 2.75 mmol per L) higher than the upper limit of normal.
    - Renal insufficiency: Creatinine clearance < 60 ml per minute per 1.73 m2 (0.25 mmol per L) higher than the upper limit of normal.
    - Bone lesions: one or more lesions:
        - Patients with hypercalcemia: Deterioration on radiographic bone lesions.
        - Bone lesions: L ow level (b) normal, or abnormal MM.
        - Reduced levels of bone density.

- **Immunomodulatory Drugs:**
  - Thalidomide, lenalidomide, pomalidomide, proteasome inhibitors.
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- **Conclusion**
  - Several patients are receiving treatment for MM.
  - Multiple myeloma is a complex hematologic malignancy.
  - It is crucial for healthcare providers to understand the pathophysiology, presenting clinical manifestations, differential diagnoses, implications for care, and other details surrounding the diagnosis and multidisciplinary and treatment referral.
  - As a result of the multidisciplinary healthcare practice in caring for an oncology patient in a comprehensive, patient-centered approach, there is a high likelihood of seeking for care in a Cancer Center.

- **American Cancer Society (2018):**
  - “30,770 newly diagnosed cases of MM in the United States in 2017” (Brigle & Rogers, 2017).
  - “1 in 3 out of lifetime risk of developing MM” (Brigle & Rogers, 2017).

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