Bone Health and Potential Risk Factors for Bone Loss in Patients with Chronic Lymphocytic Leukemia (CLL)

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Introduction

• Chronic lymphocytic leukemia (CLL) is the most common leukemia in adults with an average age at the time of diagnosis of 72 years.
• Average overall survival in the era of targeted therapies is > 10 years.
• The burden of comorbid conditions significantly impacts morbidity and mortality in older patients with CLL [1].

Ongoing Study

Patient Demographics
• 17 patients enrolled
• Average Age: 76 years
• 58.8% female
• 41.2% male
• 20% complex karyotype
• 17.6% del17p or TP53 mutations

Methods

Figure 1. Study Schema

Inclusion Criteria:
• Confirmed diagnosis of CLL/SLL
• > 18 years of age

Exclusion Criteria:
• Unable to participate in survey or undergo DXA scan

Bone Health Survey:
• Use of steroids, aromatase inhibitors, androgen deprivation therapy
• Family history of hip fracture
• Social history (tobacco, EtOH, etc.)

Clinical Diagnosis for Osteoporosis:
• Fracture risk score > 2.5
• History of fragility fracture
• PRAX score > 10-year risk of Major Osteoporotic Fracture > 20% or Hip Fracture > 3%

Table 1. Baseline Characteristics

<table>
<thead>
<tr>
<th>CLL cohort (N=10,834)</th>
<th>Comparison cohort (N=54,170)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean yrs</td>
<td>74.7 (7.8)</td>
<td>78.4 (7.3)</td>
</tr>
<tr>
<td>Sex – F/M, n (%)</td>
<td>5,472 (50.5)</td>
<td>27,360 (50.5)</td>
</tr>
<tr>
<td>Race – White, n (%)</td>
<td>10,059 (92.8)</td>
<td>50,296 (92.8)</td>
</tr>
<tr>
<td>Marital status – Married, n (%)</td>
<td>1,996 (14.7)</td>
<td>7,283 (13.4)</td>
</tr>
<tr>
<td>Any prior use of bisphosphonate, n (%)</td>
<td>1,108 (10.2)</td>
<td>4,688 (8.7)</td>
</tr>
<tr>
<td>Chemotherapy/intervention, n (%)</td>
<td>1,231 (11.4)</td>
<td>1,579 (2.9)</td>
</tr>
</tbody>
</table>

• Patients with CLL had a significantly higher incidence of osteoporosis and osteopenia compared to the general population.
• 49% of patients with CLL had bone loss.

Preliminary Studies

• Retrospective cohort study aimed at examining the prevalence of osteoporosis, osteopenia, screening of bone mineral density by DXA, use of therapeutics for osteoporosis or osteopenia, and cumulative incidence of fragility fractures.

• Methods:
  - Obtained a nationally representative 5% sample of Medicare files from CMS between 2010 – 2015.
  - Defined cohort of beneficiaries with CLL based on diagnosis of CLL.
  - Selected non-cancer control cohort (age/gender matched).
  - Identified diagnoses based on ICD-9 or 10 codes.
  - For DXAs, searched common CPT codes.

Figure 4. Clinical Diagnosis

Table 2. Cumulative Incidence of Bone Density Screening

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<th>Comparison Cohort (N=54,170)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Bone density screening 1-year</td>
<td>2,213 (20.1)</td>
<td>5,741 (10.7)</td>
</tr>
<tr>
<td>Bone density screening 2-year</td>
<td>2,302 (21.1)</td>
<td>5,881 (11.0)</td>
</tr>
<tr>
<td>Bone density screening 3-year</td>
<td>2,388 (21.8)</td>
<td>5,961 (11.0)</td>
</tr>
</tbody>
</table>

• Patients with CLL had a significantly higher incidence of osteoporosis and osteopenia.
• However, lower rates of bisphosphonate use.

Table 3. Cumulative Incidence of Osteoporotic Bone Fractures

<table>
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<tr>
<th>CLL Cancer Cohort (N=10,834)</th>
<th>Comparison Cohort (N=54,170)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bone fracture 1-year</td>
<td>1,497 (13.7)</td>
<td>3,075 (5.7)</td>
</tr>
<tr>
<td>Bone fracture 2-year</td>
<td>1,594 (14.5)</td>
<td>3,172 (5.9)</td>
</tr>
<tr>
<td>Bone fracture 3-year</td>
<td>1,691 (15.2)</td>
<td>3,269 (6.0)</td>
</tr>
</tbody>
</table>

• Cumulative incidence of fractures was higher in the CLL cohort.

Figure 3. Results of DXA Scans

• With prior hip fractures
• With prior vertebral fractures

References