Primary Lymphoma of Bone

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Primary lymphoma of the bone

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Definition

Stem Cell

Lymphoid SC

- T cell
- B cell
- NK cell
- Plasma cell

Myeloid SC

- RBC
- Platelet
- Monocytes
- Macrophage
- Granulocyte
**Definition**

- **Stem Cell**
  - Lymphoid SC
    - T cell
    - B cell
    - NK cell
    - Plasma cell
    - RBC
    - Platelet
  - Myeloid SC
    - Monocytes
    - Granulocyte
    - Macrophage

- Leukemia
  - Lymphoma
  - Myeloma

- **PLB**
Definition

Hodgkin disease

Also known as HL
Less common than NHL
Abnormal WBC (Reed-Sternberg cells)
Usually starts in Lymph Nodes (mainly nodal)
Spread in sequence from one LN to the next
Presents as swollen LN with constitutional symptoms (fever, chills, night sweats)
Chemotherapy, radiation therapy
Good prognosis
5 subtypes
Reed-Sternberg cell

Giant Binucleated Lymphocyte
Definition

- Complex group of over than 25 types of lymphomas
- 3rd most rapidly increase cancer after lung ca and melanoma
- 75% increase in last 20 years
- Constitutional symptoms
- Usually extra nodal, give symptoms depending on the organ involved
- Spread in skip pattern from one LN to the next
- Postulated causes include, genetics, chemicals, viral infections (EBV, HTLV-1) and immunodeficiency
- Diagnosed using complex histology measures (immunohistology)
- Can be divided grossly into; slowly growing, or aggressive NHL
- Chemotherapy, radiation therapy, immuno therapy, or Bone Marrow transplant
- 5 yr survival rate 51%

NHL

Lymphoma
B-Cell Neoplasms

I. Precursor B-cell neoplasm:
   a. Precursor B-lymphoblastic leukemia/lymphoma

II. Mature (peripheral) B-cell neoplasms
   B-cell chronic lymphocytic leukemia / small lymphocytic lymphoma
   B-cell prolymphocytic leukemia
   Lymphoplasmacytic lymphoma
   Splenic marginal zone B-cell lymphoma (+/- villous lymphocytes)
   Hairy cell leukemia
   Plasma cell myeloma/plasmacytoma
   Extranodal marginal zone B-cell lymphoma of mucosa-associated lymphoid tissue type
   Nodal marginal zone lymphoma (+/- monocytoid B-cells)
   Follicle center lymphoma, follicular,
   Mantle cell lymphoma
   Diffuse large cell B-cell lymphoma
   • Mediastinal large B-cell lymphoma
   • Primary effusion lymphoma
   Burkitt’s lymphoma/Burkitt’s cell leukemia

T-Cell and Natural Killer Cell Neoplasms

I. Precursor T cell neoplasm:
   a. Precursor T-lymphoblastic lymphoma/leukemia

II. Mature (peripheral) T cell and NK-cell neoplasms
   T cell prolymphocytic leukemia
   T-cell granular lymphocytic leukemia
   Aggressive NK-Cell leukemia
   Adult T cell lymphoma/leukemia (HTLV1+)
   Extranodal NK/T-cell lymphoma, nasal type
   Enteropathy-type T-cell lymphoma
   Hepatosplenic gamma-delta T-cell lymphoma
   Subcutaneous panniculitis-like T-cell lymphoma
   Mycosis fungoides/Sézary’s syndrome
   Anaplastic large cell lymphoma, T/null cell, primary cutaneous type
   Peripheral T cell lymphoma, not otherwise characterized
   Angioimmunoblastic T cell lymphoma
   Anaplastic large cell lymphoma, T/null cell, primary systemic type

Hodgkin’s lymphoma (Hodgkin’s Disease)

Nodular lymphocyte predominance Hodgkin's lymphoma
Classical Hodgkin’s lymphoma
•Nodular sclerosis Hodgkin’s lymphoma
•Lymphocyte-rich classical Hodgkin's lymphoma
•Mixed cellularity Hodgkin’s lymphoma
•Lymphocyte depletion Hodgkin’s lymphoma
Definition

Bone

Lymphoma Cells
Produced in The BM

= PLB

Lymphoma Cells
Invades the bone

= Mets
Definition

- **PLB**
  - Arising in medulla
  - Without nodal or visceral disease
  - For > 6 months after diagnosis
Epidemiology of PLB

- 5% of primary malignant bone tumors
- 94% is NHL (Large B cell type)
- Overall survival good
  - 88% @ 15 yr with combined Tx
- Recurrence
  - Uncommon @ primary site
  - Late metastases (lung, liver, brain)
- All races affected
- Male: female ratio 2:1
- Age non specific
  - Even distribution 10-88 yr
  - Rare before 10
Clinical Picture

- **Pain**
  - Slow progressing
  - Dull

- **Swelling**
  - May present
  - Large

- **Fracture**

- **Constitutional symptoms**

- **May involve multiple bones**

- **Diagnostic criteria**
  - Primary focus in single bone
  - Histologic confirmation
  - No distant ST mets, LN
Investigations

- **Plain radiographs**
  - **Classical**
    - Lytic, diaphysis, periosteal reaction, ST mass, sequestrum (late)
  - **Variations**
57 y.o. female
knee pain
large lytic lesion
in the diaphysis of the tibia
Soft tissue mass
A 5 y.o. girl

left leg pain

lytic lesion

diaphysis of the left tibia

aggressive periosteal reaction

soft tissue extension/swelling
Investigations

- **CT**
  - Extensive BM disease
  - Soft Tissue mass
  - No extensive cortical destruction
  - R/O mets and ST origin
    - Chest, abdomen, pelvis
  - Only in Ewing’s, PLB and myeloma
65 y.o. male
right hip pain
destructive lesion of the right acetabular roof
multiple small sequestra
soft tissue extension
Investigations

- MRI
  - Local staging
  - Non specific
  - Typically
    - Tumor lower intensity than muscle in T1
    - Brighter than muscle in T2
  - Contrast
    - Usually not needed (to define margin for Sx)
    - Enhancement
70 y.o. female
right leg pain
radiographic normal
Axial T2-weighted MRI at the level of the tibial tubercle
medullary canal and a large soft tissue mass surrounding the right tibia
Investigations

- Bone scan
  - None-specific
  - Increased uptake
  - Differentiate from myeloma (no increased uptake)
Histology

Round cells
- Ewing’s Lymphoma
- PNED

Spindle cells
- No matrix
  - Fibrosarcoma
  - MFH
- Cartilage
  - Chondrosarcoma
  - Chondroma
- Bone
  - Osteosarc
  - Osteoma
Normal lymphatic tissue
Mitotic figures

Fibrous stroma
Differential diagnosis

- Osteomyelitis
- Ewing’s sarcoma
  - Translocation [t (11; 22) (q24; q12)]
- Myeloma
Treatment

- **Radiation**

- **Surgery**
  - Generally not needed
  - To control primary

- **Chemotherapy**
  - Complex decision

- **Prognosis**
  - Best prognosis compared to other primary bone tumors
  - Survival @ 5 yr (90%), @ 10 yr (87%)
MR imaging characteristics in primary lymphoma of bone with emphasis on non-aggressive appearance. 
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PURPOSE: To assess the heterogeneity of magnetic resonance (MR) imaging characteristics in primary lymphoma of bone (PLB), in particular the non-aggressive appearance. SUBJECTS AND METHODS: In a retrospective study, MR imaging features were analyzed in 29 patients with histologically proven PLB. The following parameters were evaluated: tumor size, bone marrow and extension into soft tissues, signal characteristics of bone marrow and soft-tissue components, including enhancement, and involvement of cortical bone (complete disruption, focal destruction, permeative destruction and cortical thickening). RESULTS: PLB presented with extension into the soft tissue in 22 (76%) of 29 patients, was only subtle in three of these 22 patients, and was absent in seven patients. Signal intensity (SI) of the soft-tissue part was most frequently homogeneously isointense with muscle on T1-weighted images (90%) and high on T2-weighted images (91%). Enhancement was predominantly homogeneous and diffuse (82%). In 93% of patients cortical bone appeared abnormal: among those patients complete cortical disruption was seen in 28%, with extension into soft tissues in all but one patient; a permeative pattern of destruction was present in 52% of patients, 66% of these had an associated soft-tissue mass. Two patients with normal-appearing cortical bone had no extension into soft tissues. In two patients focal cortical destruction was noticed; in one patient cortical bone was homogeneously thickened, and in one patient PLB was selectively localized within the cortical bone. SI of the bone marrow tumor component was more frequently heterogeneous (in 54%), compared with the soft-tissue component, being high on T2-weighted images in 89%, intermediate in 7% and low in 4%. Similarly, enhancement was heterogeneous in 59%.

CONCLUSION: The MR imaging appearance of PLB is variable. In 31% of PLB patients, the tumor was intra-osseous, with linear cortical signal abnormalities or even normal-appearing or thickened cortical bone without soft-tissue mass, and, as such, PLB may not infrequently look non-aggressive on MR imaging.

PLB
Primary bone lymphoma--treatment and outcome.

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**AIMS:** A retrospective review of patients with histologically confirmed primary bone lymphoma (PBL) diagnosed and treated at a single tertiary referral centre between 1985 and 2003.

**MATERIALS AND METHODS:** The medical records of all patients treated for histologically primary bone lymphoma were identified using the hospital database. Data was obtained on patient demographics, stage, treatment and outcome.

**RESULTS:** Twenty-two patients with PBL were identified. Seventeen had localised disease and five had multifocal bone involvement. The median age was 50 years. Of the patients who could be graded according to the International Prognostic Index (IPI), 12 cases were classified as low risk, seven as intermediate risk and one as high risk. All patients received chemotherapy; 19 with an anthracycline-containing regimen. Eighteen patients were treated with radiotherapy to a median total dose of 40 Gy (range 30-50 Gy). Three patients had surgery instead of radiotherapy as local treatment (one fibulectomy and two endoprosthetic replacements). The median follow-up was 84.5 months (range 3-206 months). The overall 10-year survival was 74%; 92% for low-risk IPI vs 73% for intermediate-risk IPI ($P = 0.27$). The 10-year relapse-free survival was 85% overall and 83% for both low- and intermediate-risk IPI ($P = 0.87$). Local relapse was seen in one patient. Orthopaedic complications occurred in two patients--one developed a pathological fracture after biopsy before radiotherapy and the other developed avascular necrosis outside the irradiated area.

**CONCLUSIONS:** Combined modality treatment for PBL results in good local control and survival rates with acceptable toxicity.
Primary bone lymphoma: treatment results and prognostic factors with long-term follow-up of 82 patients.

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BACKGROUND: To the authors' knowledge, there is limited information on the preferred treatment and long-term prognosis of primary bone lymphomas (PBLs). All PBL cases treated at the study center between 1963 and 2003 were analyzed to determine patient, disease, and treatment factors that could affect outcome measured by overall survival (OS), cause-specific survival (CSS), and freedom-from-treatment failure (FFTF).

METHODS: A total of 101 patients with PBL diagnosed at the study institution were identified. Nineteen patients were excluded because they transferred their treatment or follow-up to another center. Disease control, survival, and prognostic factors were analyzed for all 82 remaining patients.

RESULTS: The median age of the patients was 48 years (range, 11-83 years). Approximately 80% presented with diffuse large-cell lymphoma (DLCL), and 81% presented with Ann Arbor Stage I or II disease. Approximately 57% were treated with combined modality therapy, 14% were treated with radiation therapy alone, and 30% were treated with chemotherapy alone. The median follow-up was 67 months (range, 2-280 months). The 5-year OS, CSS, and FFTF were 88%, 96%, and 81%, respectively. The 5-year OS for patients treated with combined modality versus single-modality therapy was 95% versus 78% (P = .013), and the 5-year FFTF for patients treated with combined modality versus single-modality therapy was 90% versus 67% (P = .025). The 5-year CSS for patients treated with combined modality versus single-modality therapy was 95% versus 83% (P = .065).

Using a Cox regression for multivariate analysis, age < 40 years and use of combined modality therapy were found to be favorable prognostic factors for OS, CSS, and FFTF.

CONCLUSIONS: To the authors' knowledge, the current study is the largest series of patients with PBL treated with modern curative modalities. The data demonstrate that primary lymphoma involving the bone has an excellent prognosis. Patients with PBL treated with combined modality versus single modality therapy were found to have a superior outcome, with a significantly better survival.
Take Home points

- Lymphoma of bone is either Metastatic or Primary
- PLB is a NHL type
  - Large B cell type
- Metastasize to everywhere in the body
- Characteristic radiologic appearance
  - “bony destruction + ST mass”
- Main treatment is radiation
  - Better outcome if Combined with chemotherapy
  - No surgery needed
- Good prognosis
- > 40 y.o. with lytic bony lesion
  - Mets
  - Myeloma
  - lymphoma