H102 Skeletal Manifestations of Non-Hodgkin's Lymphoma and Multiple Myeloma: A Differential Diagnosis

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After attending this presentation, participants will understand the criteria for differentially diagnosing non-Hodgkin's lymphoma (NHL) from multiple myeloma (MM) when presented with forensic skeletal material exhibiting multiple osteolytic lesions.

The primary purpose of this paper is to determine whether a differential diagnosis based solely on skeletal remains is adequate for identifying NHL from other disease processes producing multiple osteolytic lesions. The impact of this research in forensic anthropology is clear; it identifies the potential for and possible limitations of pathological diagnoses based on skeletal changes. This information helps in identification and may provide the cause of death for unidentified individuals in future forensic casework.

Lymphomas represent any neoplastic growth occurring in lymphoid tissue and are categorized into one of two subtypes; Hodgkin's or nonHodgkin's. The incidence of NHLs is three times more likely among whites than blacks, with a slight predilection for males. Primary lymphoma of bone (PLB) represents 7-25% of NHLs and predominantly produces "moth-eaten" osteolytic lesions. Diffuse histiocytic lymphoma (DHL) accounts for 68% of all PLBs and 1/3 of all childhood NHLs. Lesions are characteristically lytic; however, mixed lytic and sclerotic reactions are common. Lesions resulting from DHL are primarily distributed in the axial skeleton but often appear in long bone diaphyses.

Multiple myeloma is a disorder of white blood cells causing an over stimulation of osteoclasts while simultaneously suppressing osteoblastic activity. This aggressive disease is the most common primary malignancy of bone. It is characterized by numerous, completely osteolytic lesions that are primarily distributed in the axial skeleton and long bone metaphyses. Radiographically, the lesions have a distinctive "punchedout" appearance, especially in the cranial vault; these defects may also produce a scalloped endosteal margin in long bones. No reactive new bone is associated with the lesions. The incidence of MM is two times more likely among blacks than whites, slightly favoring males over females. Less than 1% of cases occur in individuals less than 40 years of age.

The Maxwell Museum of Anthropology at the University of New Mexico houses a large collection of skeletal remains with documented age, sex, biological affinity, cause and manner of death, and medical history. A DHL patient drawn from this collection was used to illustrate typical bony changes resulting from NHL; this individual was directly compared to the remains of an unidentified woman exhibiting similar skeletal lesions of unknown etiology.

In 1962, a 36-year-old male was diagnosed with multifocal diffuse histiocytic lymphoma. Recurrent lesions developed later that year, and his left leg was amputated distal to the femoral midshaft. Twenty years later, he developed skull lesions; this recurrence was treated with radiation. In 1986, the lymphoma returned, affecting the soft palate and right ankle. Full body and local radiation was administered, but three months later, he died of sepsis secondary to diffuse histiocytic lymphoma.

In this case, the individual's skeleton exhibits pathognomonic lesions for non-Hodgkin's lymphoma. Numerous lytic defects and areas of sclerotic deposition are present on the cranium. The left femur has osteolytic lesions, which are permeative and have a "moth-eaten" appearance. A resorptive lesion is present on the proximal fibula that has destroyed the trabeculae and created a granular appearance to the medullary cavity. Lesions on the distal half of the right tibial diaphysis have a "moth-eaten" appearance.

The remains of an unidentified woman were brought to the Office of the Medical Investigator in Albuquerque for autopsy and identification. The individual (Jane Doe) was between 20-25 years of age and of Caucasian ancestry; her skeleton exhibited multiple permeative lesions. Purely osteolytic lesions were observed on the centrum of the third lumbar vertebra and the sternum. Destruction of the sternum was marked. Three small discrete lytic lesions perforated the inner table of the calvarium affecting the diploë. Sclerotic bone addition was also noted on the parietals and occipital. The sternal end of the right first rib consisted solely of a lace-like cortical structure; no cancellous bone remains in this area. The lesions are characteristic of a rapidly progressing pathological condition spread via hematogenous or lymphatic dissemination. Diseases presenting similar skeletal changes include lymphoma and multiple myeloma.

Although she has relatively few lesions, Jane Doe's remains exhibit similar skeletal changes to those of the man diagnosed with DHL. Mixed sclerotic and lytic reactions observed on her cranium are extremely rare for patients with MM and are more diagnostic of NHLs. Radiographs also fail to show the distinctive "punched-out" and scalloped lesions of MM; instead the lesions are "moth-eaten," indicative of NHLs. The differences observed between Jane Doe and the documented individual (specifically the number of lesions) are likely related to survivorship and treatment. In addition, Jane Doe is a young Caucasian adult; this profile favors a diagnosis of DHL, a subtype of NHL that often affects younger individuals. In general, NHLs are three times more common among whites. In contrast, MM affects blacks twice as often as whites and its

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occurrence is extremely rare in individuals less than 40 years of age.

In conclusion, both lymphoma and multiple myeloma should be considered when assessing a skeleton exhibiting multiple lytic lesions. However, the skeletal lesion morphology and demographic distribution should provide adequate criteria for a differential diagnosis between DHL and MM.

Multiple Myeloma, Non-Hodgkin's Lymphoma, Multiple Osteolytic Lesions

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