Paget’s Disease (Osteitis Deformans) in Archaeological Remains: A Radiographic Differential

Andrew D. Wade  
*The University of Western Ontario, awade4@uwo.ca*

Gregory J. Garvin  
*The University of Western Ontario, ggarvin@sympatico.ca*

David W. Holdsworth  
*The University of Western Ontario, dholdsworth@robarts.ca*

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Andrew D Wade, Gregory J Garvin, David W Holdsworth.

Department of Anthropology and Schulich School of Medicine and Dentistry, University of Western Ontario & St. Joseph’s Health Care, London

**Introduction**

Paget’s disease of bone is a metabolic bone disease of unknown etiology and is the most likely disease to cause secondary bone cancer. A prevalence that increases with age. With the increasing age of modern populations, the importance of better understanding this disease will likewise increase. While *in vivo* tests for the disease cannot be performed in skeletal samples, radiographic views of archaeological remains can provide insight into the origins and natural history of the disease.

**Paget’s Disease**

Disrupts bone remodelling:

* Increase in bone resorption
* Increase in bone formation
* Formation of weaker osteoid

Untreated it can cause:

* Bowing of the long bones
* Constriction of joints
* Constriction of eyes
* Constriction of brain
* Secondary osteosarcoma

**Methods & Materials**

The case discussed here is an individual from the Grant skeletal collection: part of a sample selected for a study of age-related trabecular change in the pubis. Paget’s disease remains the only pathological condition in this individual.

**Plain film x-rays:**

- The case discussed here [3] is an individual from the Grant skeletal collection: part of a sample selected for a study of age-related trabecular change in the pubis [4].
- Untreated it can cause [2]:
  - Increase in bone resorption
  - Increase in bone formation
  - Formation of weaker osteoid
  - Most common in males over 40

**Pelvis**

Plain film x-rays of the pelvis exhibit diffuse sclerosis, well-defined lucencies, cortical thickening, and significant trabecular thickening.

**CT scan:**

CT and micro-CT scans of the left pubis also demonstrated greatly increased cortical thickness and a dramatic rarification of trabeculae.

**Spine**

Plain film radiographs of the cervical spine show minimal-to-mild sclerosis of the atlas (C1), mild sclerosis of the axis (C2), and cervical vertebrae, C4 and C7, are diffusely sclerotic.

**Skull**

Plain film radiographs of the skull demonstrate minimal pathological involvement, with only the right frontal bone demonstrating patchy sclerosis laterally.

**Femur**

Plain film radiographs of the femora exhibit diffuse sclerosis, well-defined lucencies, cortical thickening, and fewer but thicker trabeculae.

**Conclusions**

This case study demonstrates the power of radiography, particularly CT and micro-CT, in diagnosing pathological conditions such as Paget’s disease of bone. The cultural sensitivity and importance of archaeological human remains precludes the use of destructive techniques in their analysis. Where biochemistry and bone scans are also impossible, the ability to non-destructively assess the thickness and quality of bone is key to an accurate differential diagnosis of Paget’s disease of bone.

**Differential Diagnosis**

- Paget’s Disease of Bone (PDB) [2]: regional involvement, mild expansion, cortical thickening, trabecular thickening, trabecular rarification
- Osteitis Ilii Condensans [5]: increased density of ilium, no trabecular rarification
- Fibrous Dysplasia [5]: expansion of bone, variable density, ground glass opacity, cortical thinning
- Metastatic Cancer [5]: isolated sclerotic lesions
- Hyperphosphatasia [2] (“Juvenile Paget’s”): similar to Paget’s, shortened stature, skeletal malformation

**Literature cited**


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**For further information**

awade4@uwo.ca

Please contact Andrew Wade at awade4@uwo.ca

[Image 177x276 to 313x327]: Demonstrates greatly increased cortical thickness and a dramatic rarification of trabeculae.

[Image 185x261]: Demonstrated diffuse sclerosis, well-defined lucencies, cortical thickening, and numerous but thicker trabeculae.

[Image 193x367 to 296x452]: Demonstrating diffuse sclerosis, well-defined lucencies, cortical thickening, and numerous but thicker trabeculae.

[Image 341x152 to 472x431]: Demonstrating diffuse sclerosis, well-defined lucencies, cortical thickening, and numerous but thicker trabeculae.

[Image 470x146 to 630x468]: Demonstrating diffuse sclerosis, well-defined lucencies, cortical thickening, and numerous but thicker trabeculae.

[Image 470x146 to 630x468]: Demonstrating diffuse sclerosis, well-defined lucencies, cortical thickening, and numerous but thicker trabeculae.

[Image 687x53 to 727x108]: Demonstrating diffuse sclerosis, well-defined lucencies, cortical thickening, and numerous but thicker trabeculae.