H37 Differential Diagnosis of Gout in Skeletal Remains

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The goal of this study is to describe the lesions created from gout that can be identified through osteological and radiological examination.

This presentation will impact the forensic community and/or humanity by defining characteristic skeletal lesions from gout that can be used in creating a more specific osteological profile.

Characterized by the deposition of monosodium urate monohydride crystals, gout is the most common form of degenerative arthritis in males over 40, affecting approximately 1% of males in Westernized regions. It is predominately a male disorder, with rates ranging from 7:1 – 9:1 incidence of males to females. Typically first attacks of gout occur in males 30-50 years of age and in females after menopause. The prevalence of gout is rising worldwide, especially in the elderly, often in association with drug therapies such as loop diuretics and with organ transplants.

Without treatment, gout typically progresses through stages of acute inflammation known as acute gouty arthritis, followed by periods of no symptoms known as intercritical gout. As gout progresses, the intercritical periods become shorter and eventually nonexistent as the attacks become chronic. The development of urate crystal masses, called tophi, characterizes this stage. On average, chronic tophaceous gout develops twelve years after the initial attack but with a wide range; gout associated with a known cause tends to progress more rapidly than idiopathic gout. Osseous lesions typically develop when the tophi dissolve the underlying cortical bone. Roughly 50-70% of untreated gout cases progress to chronic tophaceous gout, but with treatment less than 5% of cases progress to tophaceous gout. Most individuals who develop tophaceous gout will develop skeletal lesions.

Gout shows a predilection for smaller joints and lower limbs, especially the 1st metarso-phalanygeal joint and can be monoarticular, oligoarticular, or polyarticular. The lesions can be located on the intra-articular surface, periarticular surface, or the diaphysis near the joint surface and tend to be asymmetrical in occurrence and/or severity. Clinically, the presence of urate crystals is considered to be diagnostic, but they are not always present at the time of diagnosis so a combination of other characteristics such as hyperuricemia, asymmetric joint swelling, and multiple attacks can also define gout. However, these characteristics are all associated with soft tissue and/or patient history and will be obscured and/or absent in decomposed and skeletal remains. Urate crystals are watersoluble and most likely will not be present in skeletal remains. Radiological studies have identified unique features of skeletal gout lesions. These lesions are characterized as being round or oval, eroded and scooped-out with well-defined, sclerotic margins, and little to no bone density loss.

A gross osteological examination of gout lesions has never been made from clinically diagnosed gout. Recently, an individual with a documented case of gout donated his body to the Maxwell Museum at the University of New Mexico. Gross skeletal examination of this case confirms the radiologic description of gout lesions as the scooped-out circular erosive lesions that remain in the subchondral surface and do not invade the marrow cavity. The well-defined overhanging margins are more obvious than in radiographs, are sclerotic to varying degrees, and can have a slightly different texture than the surrounding bone. Some cortical expansion may be present, but with subchondral destruction.

Gout lesions can be differentiated from similar conditions by combining osteological and radiological observations. Rheumatoid arthritis produces erosive symmetrical lesions with osteopenia and nonsclerotic, less defined margins that are limited to the joint surface. Early skeletal lesions can have a slight overhanging edge, but more developed lesions do not. Chondrocalcinosis, a form of calcium phosphate deposition disease, produces erosive, irregular symmetrical lesions with nonsclerotic, poorly defined margins that are limited to the joint surface. Psoriatic arthritis produces erosive symmetrical and asymmetrical lesions with little to no osteopenia but with poorly defined margins limited to the joint surface. Septic arthritis can produce erosive asymmetrical lesions not limited to the joint surface, but typically the lesions invade the marrow cavity with a less organized underlying bone structure. Furthermore, radiological analysis shows less defined margins and a lace-like periosteal reaction. Amyloidosis resulting in carpal tunnel syndrome, which is rare, can create erosive lesions with sclerotic margins which are not limited to the joint surface, but are often accompanied by a loss of bone density. No gross osteological description has been made for this condition.

As gout skeletal lesions are relatively rare, identifying gout lesions can be an important step in creating an osteobiography from skeletal remains. The severity of the disease required to produce a lesion should be an identifiable characteristic of an individual in life.

Gout, Differential Diagnosis, Osteological Profile

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