H66 Footnotes: Diabetic Osteopathy Used in Human Identification

Heather A. Walsh-Haney, MA, John J. Schultz, PhD, and Anthony B. Falsetti, PhD, University of Florida, C.A. Pound Human Identification Laboratory, PO Box 112545, Gainesville, FL 32611*

This poster discusses the pathophysiology of diabetes mellitus. We present three cases from the C.A. Pound Human Identification Laboratory in order to highlight how diabetic pedal osteopathies helped to establish positive identifications.

This presentation impacts the forensic community by discussing how multiple lines of evidence (medical histories obtained from physicians and families; skeletal analysis; clinical data) can be used to establish positive identification.

Diabetes mellitus is characterized by a reduced production of, or impaired response to, insulin hormone. To the exclusion of gestational diabetes, diabetes mellitus results as either: 1) an autoimmune condition that begins during childhood, with pancreatic islet ?-cell destruction and *absolute* insulin deficiency (e.g., Type-1 or Insulin-dependent Diabetes), or 2) begins in adulthood as insulin resistance or *relative* insulin deficiency (e.g., Type-2 or Non-insulin-dependent Diabetes). Type-2 Diabetics tend to be clinically obese and have a strong genetic propensity for the disease—more so than Type-1 Diabetics. Because insulin regulates how glucose is metabolized and therefore, controls body functions at a cellular level, diabetes mellitus often leads to a variety of clinical complications, including renal and ocular problems (e.g., glaucoma and cataracts), artherolosclerosis, and mucormycosis. Peripheral vascular disease, in particular, can cause additional problems, leading to diabetic neuropathy and subsequent increase in injury. Nerve damage and poor circulation, especially to the distal extremities are major contributing causes of diabetic osteopathies and amputations. Bony changes include *Charcot* joints, reduction in the size of and *sharpening* of pedal phalanges, ulcers, osteomyelitis, and transmetatarsal fractures.

The ubiquitous nature of diabetes mellitus (United States = 16.9 million people 20 years of age and older have the disease; National Disease Information Center 2003) makes it a disease in which a patient's family members, co-workers, and others, may be aware of or help the patient monitor his/her condition. Peer and physician awareness of the need for "foot monitoring" stems from the knowledge that foot ulcers, thick calluses, nerve damage and circulation problems can lead to gangrene, osteomyelitis, osteopenia, generalized insufficiency fractures, amputation, and systemic infections that, if left unattended, may lead to death.

In forensic settings, an unidentified decedent can be positively identified when the antemortem medical records and radiographs are compared to the postmortem findings and radiographs and reveal multiple consistencies and similarities. Yet, medical records and/or radiographs may not be available (e.g., destroyed or regulated by the Health Information Patient Protection Act (HIPPA)) or nonexistent due to lack of medical intervention secondary to a victim's low socioeconomic status. Therefore, interviews with a victim's family, friends, neighbors, and co-workers, who may have had knowledge of the victim's diabetes mellitus and secondary foot problems, may help medico-legal death investigators reach a presumptive identification.

We present three forensic anthropology cases from the C.A. Pound Human Identification Laboratory in order to demonstrate the use of diabetic osteopathies in positive identifications—especially when other biological factors are taken into account (age, sex, ancestry, stature, and other idiosyncratic characteristics). For the three cases below, gross, metric and radiographic osteological analysis was conducted.

Case 1: In 2002, one incomplete skeleton was discovered in a Bayou in Shreveport, Louisiana. Osteological analysis indicated that the remains were those of an elderly, black female. No obvious signs of perimortem trauma were noted. Postmortem change included carnivore and rodent scavenging damage. Antemortem trauma and pathology included severe osteophytosis, osteoporosis, bi-lateral craniotomy with evidence of craniotomy suture wires still present, and shortening and narrowing of the phalanges of the right foot.

Case 2: In 2002, one incomplete skeleton was discovered in Jacksonville, Florida. Osteological analysis indicated that the remains were those of a middle aged black male. No evidence of perimortem or postmortem trauma was noted on the remains available for analysis. Antemortem trauma and pathology included an amputated left first metatarsal, necrotic foot joints, and periostitis on both tibiae and fibulae, with a possible subperiosteal hematoma on the tibia.

Case 3: In 2001, one mostly complete skeleton was found in Volusia County, Florida. Osteological analysis indicated that the remains were those of an elderly, white male. No obvious signs of perimortem trauma were noted on the remains available for analysis. No postmortem trauma was present. Antemortem trauma or pathology included amputated pedal phalanges, including both first, proximal phalanges, and a well-healed fracture of the left ulna.

In each case, gross examination of the feet revealed skeletal alterations consistent with complications of diabetes mellitus. For all three cases, the victim's medical history came from family members, rather than the physicians' medical records because those records and radiographs were not available. Nevertheless, multiple

 ** Presenting Author*

lines of evidence, including those presumptive in nature, were used to establish the positive identifications.

Diabetes Mellitus, Foot Osteopathy, Identification

 ** Presenting Author*