

BRIEF COMMUNICATION

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Identification of Decomposed Human Remains from Radiographic Comparisons of an Unusual Foot Deformity*

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ABSTRACT: A case of positive identification from decomposed human remains using an unusual foot deformity is presented. Scrutiny of the decedent revealed foot deformities, which upon examination, prompted further inquiry. Radiographic comparisons and defleshing each foot established bilateral talipes equinovarus (TEV, clubfoot). Positive identification was based upon unique skeletal features present in the radiographs.

KEYWORDS: forensic science, forensic pathology, decomposed remains, talipes equinovarus, clubfoot, footwear, radiographic comparisons, human identification

Postmortem identification can be challenging when human remains are recovered decomposed, skeletonized, fragmented, burned, or incomplete. This paper reports positive identification of decomposed human remains from radiographic comparisons of an unusual bilateral foot deformity. Talipes equinovarus (TEV, clubfoot) is uncommon in the adult, and in the absence of antemortem medical records, this finding proved essential for identification. To our knowledge, positive identification from radiographic comparisons of TEV has not been previously reported. We describe such a case, review the literature, and propose limitations.

Case Report

In August 1999, a markedly decomposed male with extensive insect infestation and unrecognizable facial features was discovered in a spartan apartment. The apartment manager responded to complaints of a foul odor at this location. In the police photographs of the scene, the decedent's clothing included light colored socks and

black colored orthopaedic footwear (Fig. 1). The items in the apartment were apparently undisturbed and the body appeared to be intact. Therefore, all initial indications pointed to an apparent natural death.

Examination of the body revealed a markedly decomposed 79 in. (6'8"), 165 lb Caucasian male. The skin was intact and the only visible identifying characteristic was a vertical scar over the right knee; postmortem radiographs revealed a knee replacement. The upper extremities were unremarkable, however, the lower extremities presented a bilateral TEV deformity. There were no signs of acute trauma.

Several pathways to establish positive identification were taken, however, these were not successful. Because the remains were decomposed, only three fingerprints could be obtained. The others were too decomposed to yield satisfactory results. Although the presumed decedent had been arrested for vagrancy, no fingerprints were on file in either local or national databases. No information leading to either the medical or dental radiographs were available and the presumed decedent had not been reported missing by any of his relatives. Also, positive identification based on the knee replacement was not possible. Even if the product serial number had been embossed on the device, the medical records where this number would have been recorded were not available.

Footwear and the obvious foot deformities were considered to be a uniquely individual feature of the decedent. Investigators called vendors of custom orthopaedic footwear in the local area. A vendor had manufactured shoes for a client fitting the decedent's physical description. The most recent radiographs of each foot, the client's name, date of birth, and social security number were then given to the coroner's office. Of note, a clinical diagnosis of TEV was described.

Skeletal characteristics present in the antemortem and postmortem radiographic comparisons were consistent and corresponded without discrepancy. Talipes equinovarus was established radiographically and upon defleshing the feet. The pathognomonic features of TEV are forefoot adductus, hindfoot varus, and hindfoot equinus (Fig. 2), shown radiographically in Figs. 3a, 3b, 4a, and 4b. All were present in the decedent. Positive identification was established by radiographic comparisons of the unique skeletal features. Subsequently, the coroner's office contacted the decedent's mother and sister who made funeral arrangements for the body.

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FIG. 1—Decedent wearing orthopedic footwear.

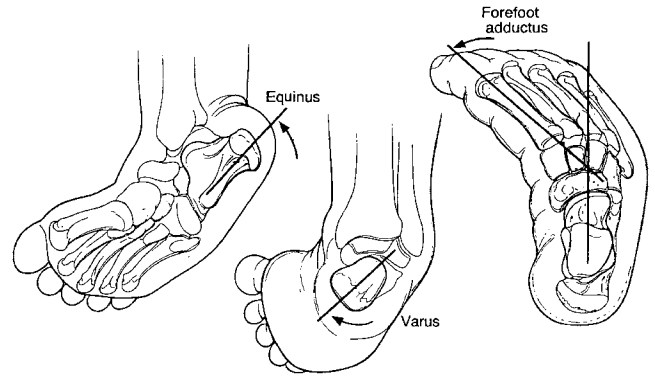


FIG. 2—Pathognomonic malalignments of talipes equinovarus. (Reprinted with permission, Grant AD, Atar D. Highlights of talipes equinovarus deformity. *Am J Orthop* 1995;24(5):393–9.)



FIG. 3—Lateral radiographic comparisons of the right foot and ankle. a) (antemortem); b) (postmortem); arrows indicate that the skeletal features were consistent and corresponded without discrepancy.

Discussion

Despite many articles in the orthopaedic literature, the etiology of TEV remains obscure and enigmatic (1–4). Talipes equinovarus is characterized as a congenital or acquired 3-dimensional foot deformity with an incidence of 0.1 to 0.15% of live births, of which 50% are bilateral, with a male to female ratio of 2:1 (2–4). Congenital TEV defects can be classified into idiopathic, neurogenic, myogenic, osteogenic, collagenous, and cartilaginous causes. Intrauterine position also has been theorized to cause TEV. Acquired TEV defects may include poliomyelitis, cerebral palsy, and vascular compromise.

In developed countries, it is uncommon to find the congenital or acquired presentation of this deformity in the adult because orthopaedic manipulation, either by casting techniques or surgical intervention, is usually performed (2–4). Given the linear radiodensities (regions of dense bone which appear white radiographically) in both calcanei, further discussion as to a possible post surgical defect in the presented case is warranted.

A “sliding” osteotomy (surgical cut into bone) in the calcaneus is sometimes used in TEV patients to alter the deformity and provide a more functionally shaped foot for ambulation. We postulate that the decedent may have undergone this surgical intervention for the bilateral TEV. Given both the antemortem and postmortem ra-



FIG. 4—Lateral radiographic comparisons of the left foot and ankle. a) (antemortem); b) (postmortem); arrows indicate that the skeletal features were consistent and corresponded without discrepancy.

diographic presentations of TEV, we surmise that the decedent may have had considerable pain upon ambulating as the osteotomy perhaps did not fully correct the foot deformity.

Radiographic comparisons of the foot and ankle to establish positive identification have been reported, albeit sparsely, in the medical and forensic literature. In the historic Noronic liner fire of 1949, Singleton reported positive identification of a decedent from a left foot using skeletal landmarks (5). In another forensic investigation, trabecular patterns and surgically fused interphalangeal joints established identification from a left foot recovered from a farmyard (6). Brogdon described a similar case in which surgical modification of an ankle joint by a tibiotalar fusion was ascertained by postmortem radiographic examination (7). Because antemortem radiographs were unavailable, only a presumptive identification could be made. In another investigation, radiographic comparisons of spurs present in the legs and feet established identification (8). To our knowledge, positive identification from radiographic comparisons of TEV has not been previously reported.

There are several possible reasons that may account for this. First, other anatomical regions such as the skull, spine, and pelvis may be more available for radiographic comparison, thereby having a greater potential forensic value. Second, unique congenital and acquired malformations of the foot and ankle may be less familiar to forensic experts. Also, more common foot deformities could increase the potential for misinterpretation of identity and may therefore be of dubious value for exclusionary purposes. Third, osteophytes (“outgrowths” of bone) and other bony irregularities can provide the basis for radiographic comparisons and may establish identification more readily than corroboration with a specific foot deformity. In the presented case, skeletal features, including osteophytes, corresponded without discrepancy and were important for identification purposes. Lastly, foot and ankle deformities can be used in conjunction with additional anatomical re-

gions to corroborate identity and therefore may not be essential for positive identification if other means are available.

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