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Case Report
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Legg-Calvé-Perthes Disease as an Individualizing Factor in a Contemporary Osteological Collection: Case Report

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ABSTRACT

Introduction: the identification of human remains is a legal, ethical and social problem. By assigning an identity to a corpse or skeleton, forensic sciences allow the remains to be returned to their relatives. In order to identify the remains, in addition to outlining the biological profile of the bones, it is necessary to look for individualizing factors, such as anatomical variations, traumas or diseases that affect the bones - which may link the material to a specific missing person. The objective of this study was to report the occurrence of Legg-Calvé-Perthes disease in a contemporary osteological collection from the Northeast region of Brazil.

Case Report: the disease, whose cause is still unknown, begins in the first years of life and consists of ischemia and subsequent necrosis of the femoral head, followed by revascularization, inflammatory reabsorption and deposition of new bone, with a completely different shape from the original. In most cases, there is severe degenerative arthritis, resulting from friction between the joint surfaces.

Conclusion: knowledge of the normal structure of bones, their variations and the diseases that can affect them is essential for human identification.

Keywords: Forensic Anthropology; Legg-Calvé-Perthes disease; Individualizing factor.

Introduction

The identification of human remains is not only a legal issue, but also a social and ethical issue. In this sense, Forensic Anthropology becomes increasingly important, especially when the body found is in an advanced state of decomposition, carbonized or already skeletonized[1].

The identification of human remains occurs in two stages: reconstructive and comparative. In the first stage, the biological profile of the skeleton is estimated (i.e., sex, population affinity, age at death and stature). However, this first analysis is not sufficient to attribute the skeleton to a specific person, but rather to serve as an exclusion criterion when compared with information from missing persons databases. A comparative analysis seeks to identify individualizing skeletal factors in the skeleton, either anatomical variations or pathological conditions, unique to each individual[2].

In this sense, the specialist must thoroughly investigate the available bone material and have vast anatomical knowledge to differentiate between a mere variation and what may be an abnormal condition[3]. Comparing these conditions with imaging tests and information provided by family members is a powerful tool in the positive identification of remains.

In this perspective, the present study reports Legg-Calvé-Perthes Disease (LCPD) as an individualizing factor in a contemporary osteological collection from Northeastern Brazil.

Case Report

Male individual, age at death 47 years, incomplete skeleton from the public cemetery of Vitória de Santo Antão (PE, Brazil), belonging to the collection of contemporary bones of the Laboratory of Human Identification and Forensic Osteology (LIHOF) of the Academic Center of Vitória (CAV) of the Federal University of Pernambuco (UFPE). Undetermined cause of death. Individual died without medical assistance.

Severe bilateral lesions are noted in both femoral heads and acetabulums. There is intense osteophytic growth in the femoral heads, which have become enlarged in a mushroom shape, with shortening and thickening of the femoral necks, without slippage of the femoral heads. The distal diaphyses and epiphyses show

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no changes. There is extensive marginal osteophytic growth in the acetabulum, with lateral displacement of the right acetabular notch. In the articular regions, there are smooth, polished and shiny points, reflecting light, resulting from the wear of the articular cartilage and friction between the bones (Figure 1). A steel sliding caliper (Brasfort ® 150mm/6", with precision of 0,02mm/0,001") was used to obtain the measurements of the head and neck of the femurs. To establish the reference standard of normal measurements for the femoral head and neck for the age range of the collection, the average measurements of healthy left femurs of male individuals aged between 40 and 50 years (n=5) were obtained. Measurements of the right/left femurs with the aforementioned lesions were also obtained and the results were placed in a table for comparison with the normal mean. Comparison of the measurements of the normal femur with the altered femurs reveals the great variation in the diameters of the heads, as well as extensive reduction of the femoral necks (Table 1). The injury is consistent with LCPD (Figure 2).

Discussion

LCPD is an uncommon condition, affecting 1 in 1.200 children, especially between the ages of 3 and 9[4]. It was described in 1910 by Arthur T. Legg, Jacques Calvé and Georg Perthes and, since then, its etiological factors have not been fully understood[5]. In most cases, the involvement is unilateral, being bilateral in only 10 to 20% of them[6]. In women, due to earlier maturation of the skeleton, the prognosis is more dire[7].The disease is caused by osteonecrosis of the femoral head, with an unknown cause. Although there is still no established genetic pattern, the disease tends to affect more than one individual in a family and is more common in men and in central Europeans and Asians than in people of African descent[8].

The disease begins prematurely in healthy children, resulting from at least two ischemic episodes in the head of the femur[5], which can be insidious or triggered by factors such as trauma, thrombosis and embolism. Malnutrition has also been suggested as a possible etiological agent. Osteonecrosis can occur in any bone of the skeleton, but in the case of LCPD, the situation is aggravated by the limitation of collateral circulation and impairment of the growth cartilage of the femoral head[8].

The disease develops in 4 well-defined stages[9]: a) 6 to 12 months: after ischemic necrosis of the bone and ossification center, the femoral head becomes smaller; b) regenerative period: with revascularization, the necrotic bone is reabsorbed and gradually replaced by newly formed bone. This phase lasts from 1 to 3 years and during this period the contour of the bone is remodeled. c) reossification: the radiodensity of the necrotic epiphysis increases; d) residual: maturation of bone tissue, with definition of the final shape of the femoral head.

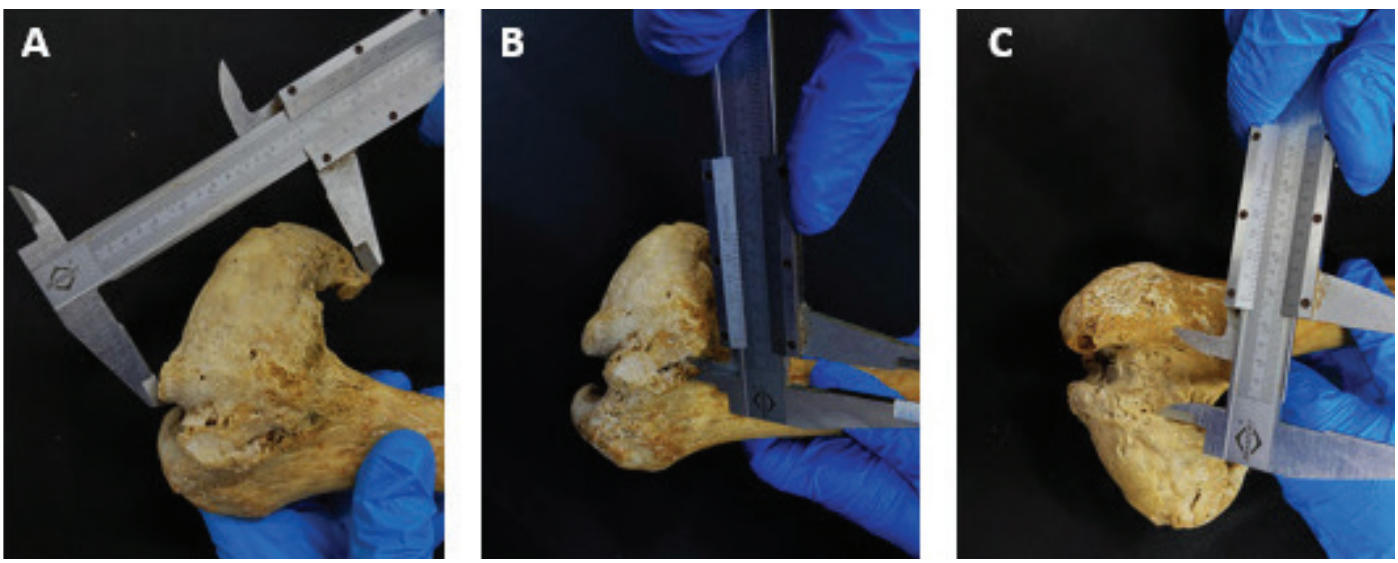

Figure 1. A) Measurement of the maximum diameter of the femoral head (anterior view). B) Measurement of the distance between the midpoint of the intertrochanteric line and the rim of the femoral head (anterior view). C) Measurement of the midpoint of the intertrochanteric crest and the rim of the femoral head (posterior view). Source: Contemporary Bone Collection of LIHOF-CAV-UFPE, 2025.

Table 1. Measurements of the maximum diameter of the femoral head (MDFH), anterior face of the femoral neck (AFFN) and posterior face of the femoral neck (PFFN). Note extensive increase in the femoral heads and reduction in the femoral necks in the individual with LCPD.

	MDFH	AFFN	PFFN
Average measurements of normal left femurs of 5 males from the LIHOF collection (40-50 years old)	4,40 cm	3,39 cm	4,30 cm
Measurements of the right femur of a 47-year-old male with LCPD (LIHOF)	7,0 8 cm	0,58 cm	2,55 cm
Measurements of the left femur of a 47-year-old male with LCPD (LIHOF)	6,27 cm	1,69 cm	1,99 cm

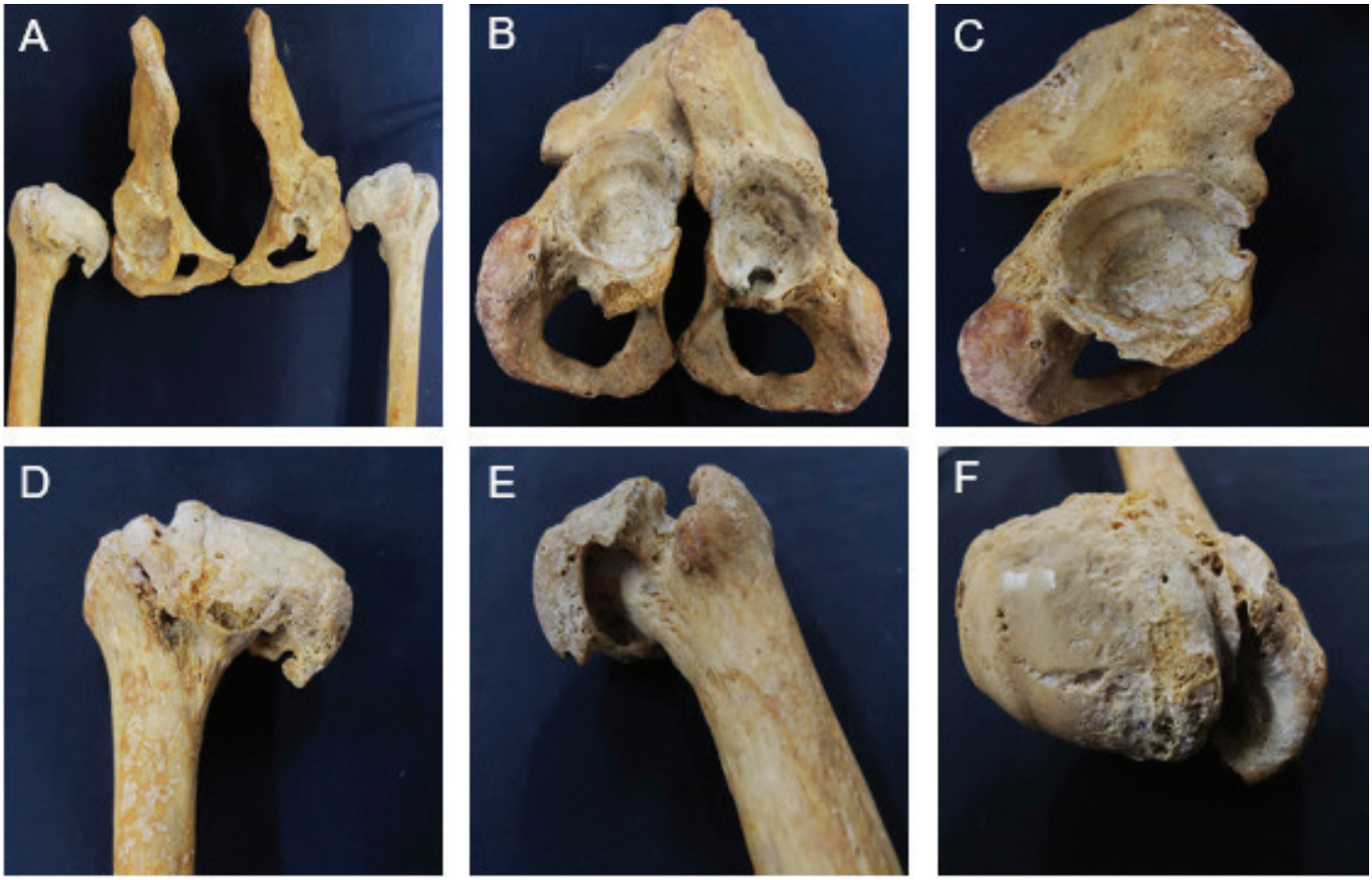

Figure 2. A) Bilateral LCPD. Anterior view of the femoroacetabular joints. There are no changes in the femoral diaphyses. B) Right and left acetabula. Note grooves on the articular surface and intense osteophytic growth on the acetabular margins. C) Right acetabular notch displaced to the center. D) Proximal epiphysis of the right femur in anterior view. There is no displacement of the femoral head in relation to the greater trochanter. E) Posteroinferior view of the right femoral head. Note the deformation of the femoral head resulting from severe degenerative arthritis, assuming a "mushroom" shape and the shortening of the femoral neck. F) Top view of the head of the right femur. Note the shiny/polished surface (eburnation) due to friction between the bones.
Source: Contemporary Bone Collection of LIHOF-CAV-UFPE, 2025.

Symptoms range from severe pain to difficulty walking. The pain increases with movement, but gradually extends to periods of rest[8]. Diagnosis is made through the patient's clinical and family history, as well as imaging tests[10]. Early diagnosis is of fundamental importance; when made after 6 years of age, the prognosis becomes more difficult. The traditional treatment, immobilization of the femoral head in the acetabular concavity with the Atlanta Scottish Rite orthosis, is no longer recommended; instead, reducing the load on the joint by using a wheelchair and physical therapy is more advisable to reduce pre-surgical pain[5]. The most appropriate treatment is reduction osteotomy of the femoral head, to maintain its sphericity[11] or total joint replacement[8].

In individuals who are not diagnosed early, the head of the femur flattens, acquiring a mushroom shape with a widened margin. The femoral neck becomes short and thick or almost non-existent. The lack of stability causes severe degenerative arthritis, which completely changes the appearance of the joint[10]. In these cases, the articular surfaces, especially the central region of the femoral head, where there is more contact with the acetabulum, may appear shiny, with grooved and flattened areas, resulting from friction between the bones - femoroacetabular conflict (eburnation)[12].

Individualizing skeletal factors are essential for the positive identification of human skeletal remains. When searching for specific alterations in a skeleton, the forensic anthropologist can compare this information with *antemortem* data of the individuals sought and, ultimately, return the remains to their relatives. LCPD, being an uncommon condition, is an individualizing skeletal factor found in the LIHOF-CAV-UFPE contemporary bone collection. Understanding the normal anatomical structure, variants and pathological conditions associated with the skeleton is fundamental to forensic anthropology.

Ethic statements

The authors state that every effort was made to follow all local and international ethical guidelines and laws that pertain to the use of human cadaveric donors in anatomical research[13].

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