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A CASE OF DEGENERATIVE ARTHRITIS AND OSTEOMYELITIS FROM PARDUBICE (CZECH REPUBLIC)

ABSTRACT: *The purpose of this article is to discuss a particular specimen exhibiting severe pathological conditions to its knee joint and tibia. A differential diagnosis is carried out in order to discuss the possible causes of these pathological changes. According to all observed features it is inferred that the individual has suffered from both degenerative arthritis and osteomyelitis. Suppurative etiology of the joint lesions is ruled out on the basis of both visual and X-ray examinations. It is suggested that osteomyelitis of the tibia could have affected the functional demands of the knee joint.*

KEY WORDS: *Medieval cemetery — Degenerative arthritis — Osteomyelitis.*

INTRODUCTION

In May 1993, an archaeological rescue excavation was carried out in the vicinity of a recent graveyard in Pardubice (Czech Republic). This site is a classical medieval multi-layered cemetery. The oldest burial is well dated to the second half of the 13th century, by a coin (brakteat) which was minted between 1260–1278. The majority of burials, however, belong to the 15th–16th centuries. The cemetery has so far provided about 60 skeletons and others will be excavated during the following year.

During the course of the excavation a part of a left lower extremity (femur, tibia, fibula) was identified in an upper filling layer above a kiln. These remains belong to a burial which, like the others at the site, was disturbed by both past and recent building activities, so that only the above mentioned bones have been preserved. They were, according to the excavator, still in anatomical order, which may indicate that complete decomposition of the cadaver had

not taken place at the time when the grave was disturbed by past activities (Duday et al, 1990).

MACROSCOPIC DESCRIPTION

Only limited anthropological data could be derived from the material due to the relative incompleteness of the find. The sex of the individual could only be preliminarily determined by means of general robusticity as male. A more reliable assessment may be made after all the cemetery population will be examined, discriminant functions for long bones being then available. Concerning age, no precise assessment can be specified other than the fact that the individual was an "older adult", taking into consideration the complete epiphyseal fusion as well as the chronic degree of the pathological condition. It is this particular condition which forms the subject of this paper.

The distal end of the femur is covered by a gross new bone formation, presented mainly on the antero-

lateral face, following the articular surface with the patella (Figure 1), as well as on the tibial articular surface, where massive appositions occur on the anterior portion of both lateral and partly medial condyles, with the posterior portion being more or less spared. It can be noted that on the postero-medial surface of the medial condylus small pitting also occurs (Figure 2). The rest of the femur can be defined as normal, only the trochanter major has suffered post-mortem damage.

In the case of the tibia, we can observe the production of new eburnated (polished) bone, loca-



FIGURE 1. Affected knee joint. Note new bone formation following the articular surface of the patella (photo: H. Toušková).



FIGURE 2. Distal aspect of the femur. Note new bone formation situated anteriorly and the small pitting occurring on the lateral condylus (photo: H. Toušková).

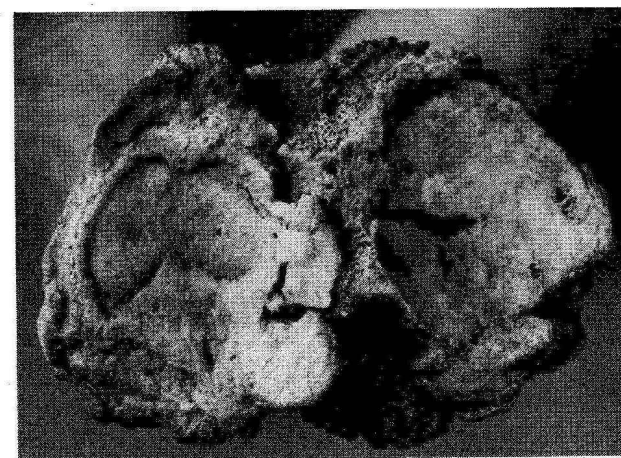


FIGURE 3. Proximal aspect of the tibia. Note polished bone on the medial condyle, striations on the posterior part of the lateral condyle and marginal lipping along the circumference of the lateral condyle (photo: H. Toušková).

ted mainly on the medial aspect. Both the tuberculum intercondylare laterale and mediale are involved in these changes. On the lateral side, eburnation is present posteriorly and parallel grooves (striations), responding to the functional demands of the knee joint, are consistent with the presence of a more mobile lateral meniscus. Articular margins are uneven and marginal lipping is developed on the lateral condylus along its circumference (Figure 3). It is clear that changes to the joint respond to the loss of articular cartilage in places where the main stress was located. The fact that the tibio-fibular joint is not involved in the pathology is consistent with the functional dependence of the lesions.

As for the tibial diaphysis, in posterior view we can see a remarkable degree of osteophytes, following

the muscle attachments of the musculus soleus, popliteus and semimembranosus (Figure 4). On the anterior aspect, new bone formation is quite regularly distributed on the sharply defined proximal part of the shaft (Figure 5). About 3 cm below this condition two cloacae occur within a depressed area, with a porotic surface extending approximately 30×20 cm. In this place it is possible to observe a minor change in the form and thickness of this limited part of the shaft. It is important to note that there is a sharply



FIGURE 4. Posterior portion of proximal tibia. Note osteophytes following the muscle attachments (photo: H. Toušková).

defined boundary between proximal subsynovial osteophytes and the nearest cloaca, so that the two conditions are not related according to macroscopic examination. In order to prove this hypothesis, X-ray examination was carried out on this specimen.

The fibula has suffered only minor bone alterations. Small osteophytes are only visible to its proximal end (capitulum fibulae).



FIGURE 5. Anterior portion of proximal tibia showing two pathological conditions: firstly, osteophytosis related to degenerative arthritis of the knee joint, and secondly, two cloacae, situated approximately 3 cm below, above the depressed area (photo: H. Toušková).

X-RAY EXAMINATION

We examined all the three bones by X-ray and also made tomograms of the tibia. The results of X-ray examination of the femur correspond broadly with those obtained from macroscopic examination. As to the femur, degenerative and productive changes are visible in the distal end of the bone. The borders of articular facets are not smooth, with areas of eburnation and osteophytes surrounding articular surfaces. There are no visible changes in the bone texture.



FIGURE 6. X-ray of anterior view of the proximal diaphysis of the tibia, showing chronic inflammatory changes (X-ray picture: S. Strnad).

Degenerative and productive changes, in the sense of degenerative arthritis of the knee joint, are also visible in the X-ray pictures of the tibia. The pictures show that inflammatory changes involved the metaphysis and the proximal two thirds of the tibial shaft (Figure 6). Other areas of destruction are visible as transparent defects inside the bone. We can see them better on the tomogram. The most transparent area (2.5 × 1 cm) corresponds to the deep defect below the tuberositas tibiae. We can also observe in this portion approximately round, transparent areas

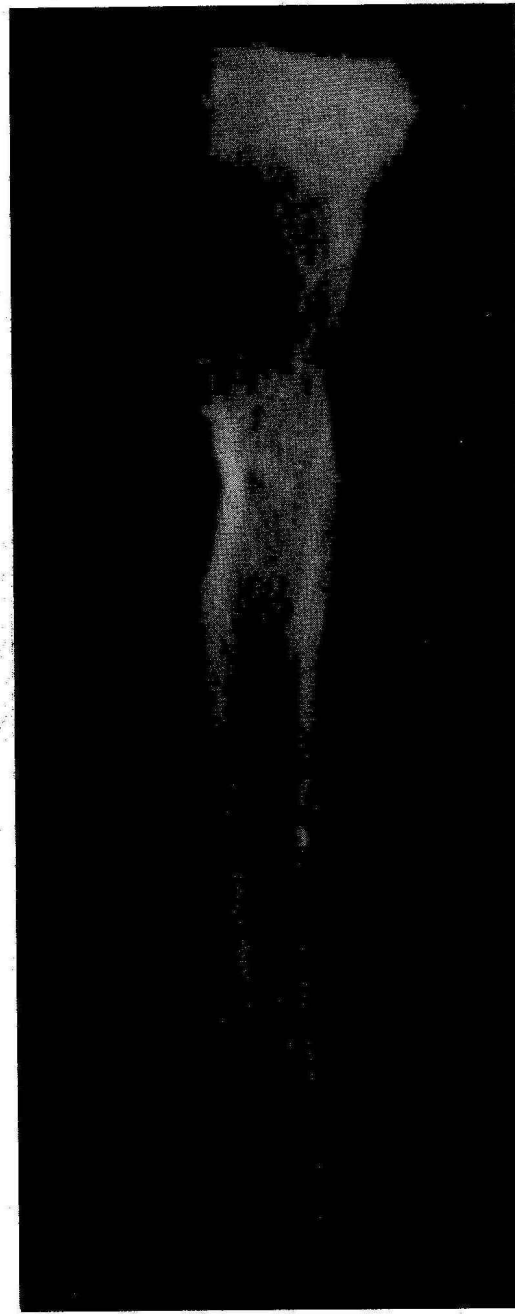


FIGURE 7. X-ray of lateral view of the proximal diaphysis of the tibia, showing chronic inflammatory changes (X-ray picture: S. Strnad).

associated with cloacae. A small transparent area with sclerotic dense surroundings is located near to the epiphysis. This condition looks rather like an abscess.

Definite inflammatory signs of epiphyseal involvement could not be differentiated. Only the sub-articular bone is sclerotically dense. This is associated with degenerative arthritis. Traces of the epiphyseal disc were not observed, supporting the suggestion that the individual was an adult.

A marked widening of the metaphysis and the proximal half of the shaft is apparent in the X-ray pictures (Figures 6, 7). It is due to periosteal new bone formation, which is partially laminated. The new bone formation obliterated the medullary cavity, only the cavity of the distal third of the shaft remaining.

It seems that there are no sure sequestra inside the bone. It is supposed, however, that there was a sequestrum located in the area of the depression (Figure 7).

The X-ray examination of the fibula does not show any important pathological changes.

DIFFERENTIAL DIAGNOSIS

From the above descriptions and according to recent classifications it is clear that the individual suffered from both a severe degenerative and inflammatory disease. In the case of inflammation, we can exclude specific types encountered in osteological material, particularly tuberculosis and syphilis.

Tuberculous osteomyelitis usually causes more simple modifications than those described above, and the sclerotic and periosteal reaction in tuberculosis is also less developed, the tuberculous abscess not having a sclerotic surrounding. In general, tuberculous osteomyelitis rarely occurs on shafts (Vyhnánek 1990).

Since no typical gumma formations were identified, a question remains concerning the tertiary treponematosis in the form of a non-gummatous periostitis on the tibia. This can definitely be excluded as, except for the thickening of the above mentioned limited area, the entire form of the bone is not affected. The most reliable exclusion can be made by virtue of the presence of cloacae, which do not occur in syphilis (Ortner, Putschar 1981). In addition, sequestration does not appear likely as it is more concerned with changes to the interior of the bone (Vyhnánek 1990).

Lesions on the anterior face of the tibia are characteristic of the early stages of chronic osteomyelitis, i.e. non-specific inflammation of the bone. There are two cloacae and the depressed area can be considered as the consequence of either flowing of pus from the cloacae or resulting from sequestra formation. As to the joint lesions, it could be inferred that the inflammation transferred to the nearest situated joints through the marrow cavity, but X-ray examinations did not prove this possibility. In addition, our specimen does not appear to have traces of features typical for septic arthritis, i.e. the

absence of eburnation and the presence of ankylosis (Rogers, Waldron 1989).

All observed features are consistent with the diagnosis of degenerative not suppurative arthritis, recently well described by Rogers et al. (1987). Stress seems to be one of the most important provoking factors (Ortner, Putschar 1981).

It is difficult to say to what extent the two processes were really interdependent during the life of the individual. It is suggested that osteomyelitis could have affected the functional demands of the joint. If this suggestion is correct, then we might expect a relatively long coexistence of the two processes in the pre-antibiotic period.

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