

Brodie's abscess in a tibia dating from the Neolithic period

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Summary. Radiological and macroscopic characteristics typical of Brodie's abscess were observed in inferior metaphysis of a tibia estimated to be 5,000 years old.

The use of rigorous anatomico-radiological criteria in studies of bone paleopathology can provide the doctor with accurate data regarding diseases of the past in bone specimens rarely at their disposal. This approach is also necessary to obtain valid data for paleontologists, pre-historians and archeologists.

Key words: Osteomyelitis – Brodie's abscess – Paleopathology – Neolithic period

For obvious reasons, paleopathological studies are usually based on skeletal specimens. It is therefore desirable that specialists in bone pathology become involved in such studies, not only because of the important contribution that they can make but also because of the opportunity to enlarge their own scope of knowledge of bone diseases. It was through a collaboration of this kind that it was possible to establish the existence of chronic osteomyelitis in man as far back as the Neolithic period (Moodie 1923; Pales 1930; Steinbock 1976; Brothwell 1981). In the present paper it is shown that this chronic osteomyelitis may have the morphological characteristics of a Brodie's abscess.

Case report

An anthropological investigation of the necropolis of Corseaux-sur-Vevey, Switzerland, determined by uncalibrated ¹⁴C to date from 3,200 to 2,500 B.C. i.e., middle Neolithic period (Kramar 1982), provided the opportunity to study two tibias thought to come from the same

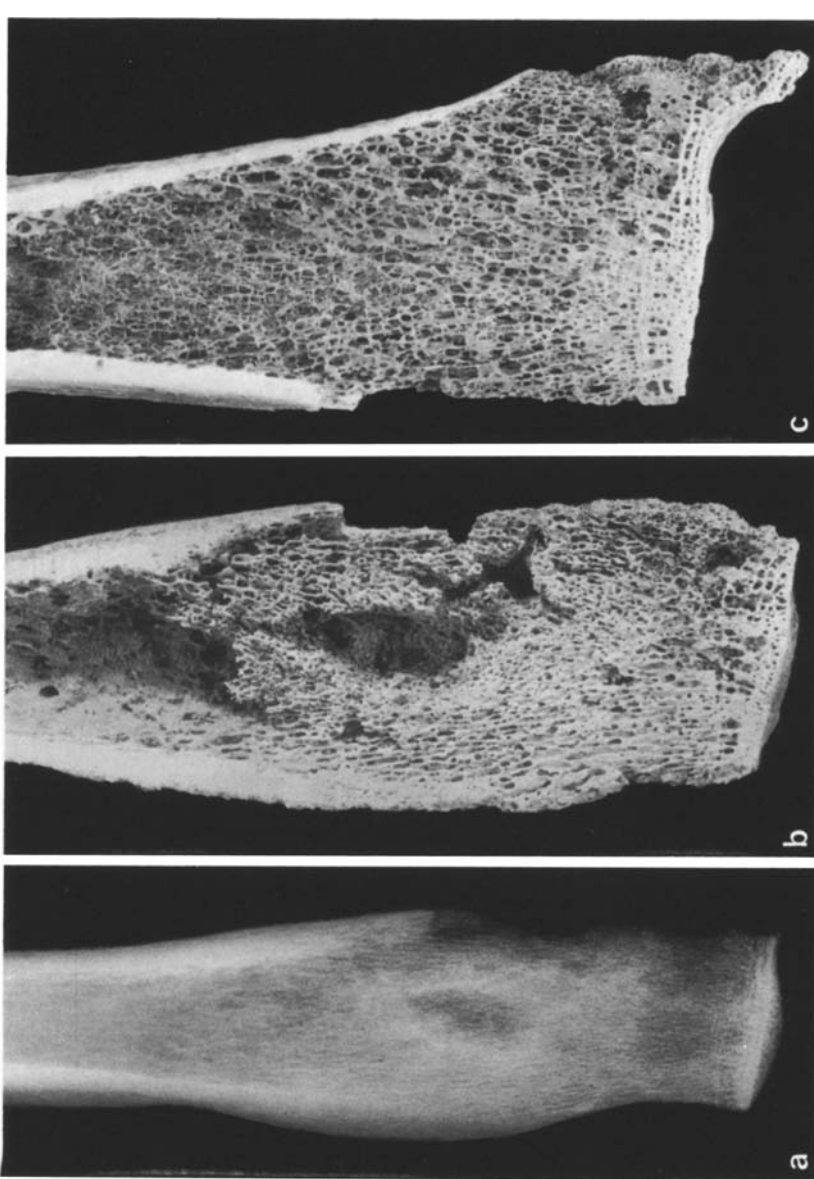


Fig. 1. a AP X-ray ($\times 1$) of the left tibia. **b** Macroscopic aspect of the posterior frontal section of the left tibia ($\times 1,4$). Osteosclerotic remodelling around the cavity. Inferolateral fistula. **c** Normal macroscopic aspect of the anterior frontal cut surface of the right tibia ($\times 1,4$).

adult male skeleton (specimen references: 1973-3/3, Department of Anthropology; T. 1634/82, Institute of Pathology; IC 1016, Institute of Morphology; all of University of Geneva). One tibia showed a swelling of the inferior metaphysis but with a smooth exterior surface. The X-ray showed, in this overblown metaphysis, the characteristic aspect of a bone abscess cavity the edge of which was surrounded by a zone of sclerotic remodelling (Fig. 1a). After medial frontal sectioning this cavity could be seen macroscopically with part of a fistula oriented toward the bottom and surrounded by a zone of sclerotic cancellous bone (Fig. 1b). The cortex was deformed and flanked by a thin layer of periosteal bone.

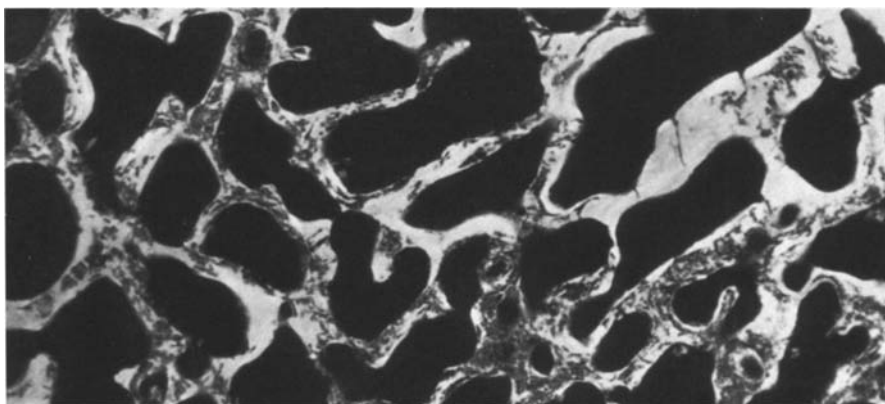


Fig. 2. Microradiograph of the cancellous bone in the supero-medial region near the cavity ($\times 15$). Thickened trabeculae in the right third of the picture. Post-mortem erosion by bacteria and fungi, less pronounced on the thickened trabeculae

A culture from the bone cavity showed no bacteria or fungi. The microradiograph showed a thickening of cancellous trabeculae surrounding the cavity but also that the bone tissue was affected by postmortem boring by fungi and bacteria (Fig. 2). Radiological and macroscopic examination of the right tibia showed no abnormality (Fig. 1c).

Discussion

Although the pathological specimen examined in the present study could obviously not provide a histologically based diagnosis, it was nevertheless possible to exclude a benign tumor that might have caused an overblown aspect of the bone and to make the diagnosis of Brodie's abscess. The macroscopic aspect of the lesion seems to be similar to that reported by Brodie in his original description of a tibia of an amputated leg (Brailsford 1938). The X-ray image is also in agreement with descriptions of known cases of this kind of intra-osseous abscess (Brailsford 1938; Harris and Kirkaldy-Willis 1965; Resnick and Niwayama 1981). Furthermore the bone changes present elements reported in the literature for Brodie's abscess and the location in the inferior metaphysis of the tibia corresponds to the most frequently reported site (Brailsford 1938; Harris and Kirkaldy-Willis 1965; Resnick and Niwayama 1981). A fistula is present in front of the wall of the cavity (Resnick and Niwayama 1981) and signs of periosteal bone formation are observed (Brailsford 1938; Resnick and Niwayama 1981).

In the present case, the overblown appearance of the cortex indicates slow evolution of the lesion. This may be related to the fact that here the lesion is observed in an adult while Brodie's abscess is usually considered to occur most frequently in children or adolescents, particularly males (Brailsford 1938; Resnick and Niwayama 1981).

To the best of our knowledge, there has been no mention of intraosseous Brodie's abscess in studies of bone specimens dating from the Neolithic period (Moodie 1923; Pales 1930; Steinbock 1976; Brothwell 1981; Ortner and

Putschar 1981). This abscess is considered to be mainly staphylococcal in origin (Harris and Kirkaldy-Willis 1965; Resnick and Niwayama 1981) and its development suggests diminished virulence of the particular coccus attacking the bone or an increased resistance of the affected subject (Harris and Kirkaldy-Willis 1965). It seems likely, therefore, that such biological conditions could also have existed in Neolithic times. Further systematic investigation of ancient bone specimens, using anatomical and radiological techniques, would be of interest to determine the relative frequency of Brodie's abscess as compared with other infectious lesions of the bone. If this frequency were found to be high, one could invoke the hypothesis suggested by Harris and Kirkaldy-Willis (1965) according to which people who do not wear shoes would acquire a degree of resistance to infection (mainly staphylococcal) that would favor the development of Brodie's abscess and other forms of primary subacute pyogenic osteomyelitis.

The present study also suggests certain general comments regarding bone paleopathology. The use of rigorous criteria based on radiological and anatomico-pathological analyses is necessary to ensure an accurate diagnosis. The anatomico-pathological analysis should be principally macroscopic, with observations made on sawn bone sections rather than the entire bone sample alone. Histological examination should also be performed especially by means of microradiography (when this has not been made unreadable by postmortem boring by micro-organisms (Arnaud et al. 1981; Hackett 1981).

This approach enables the paleopathologist to act as a "forensic pathologist" for paleontologists, prehistorians or archeologists. It would also provide doctors with valuable information concerning morbidity in past times; for purposes of teaching and research, they would thus have at their disposal bone specimens that are rarely available and that have not been modified by modern therapeutic treatment.

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Note of the managing editor

If readers of the article by Lagier, Baud and Kramar are interested in getting better acquainted with the methodological problems encountered in diagnostic papers on fossil skeletal remains, they should refer to the richly illustrated monograph by C.J. Hackett.

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