

A MEDIEVAL POLISH SKELETON EXHIBITING AN UNUSUAL PATTERN OF CRANIAL AND POST-CRANIAL LESIONS

AMANDA AGNEW¹, HEDY JUSTUS¹, DON ORTNER², BRUCE RAGSDALE³, SAM STOUT¹

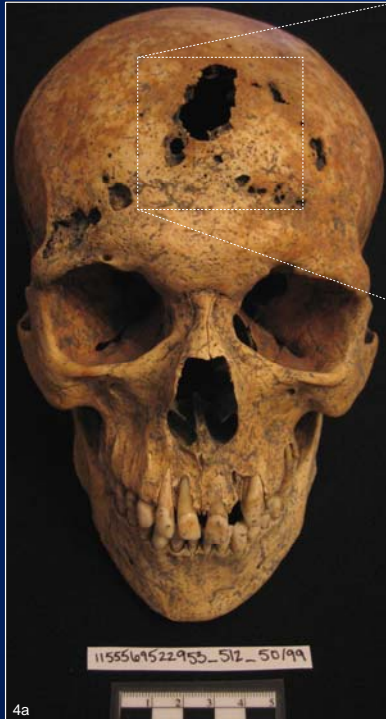
¹THE OHIO STATE UNIVERSITY, ²THE SMITHSONIAN INSTITUTION, ³ARIZONA STATE UNIVERSITY

Introduction

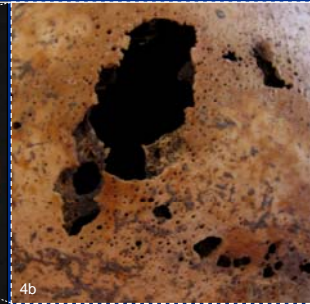
• A skeleton with an unusual presentation of cranial and post-cranial lesions is shown. Skeleton 50/99, a young male (17-19 years), is from the medieval (XI-XII c) cemetery site Gz4, in Giecz, Poland. Giecz was a rural agricultural settlement that served as a political and economic center in the newly formed Polish state. Of the 278 skeletons excavated to date, this individual is the only one exhibiting lesions of this type. The unique character and distribution of lesions are consistent with actinomycosis.

• Actinomycosis is a chronic granulomatous bacterial infection caused by any of six *Actinomyces* species in humans. It is suppurative, characterized by medullary abscess formation and draining sinuses¹. *Actinomyces israelii*, bacteria normally associated with the oral cavity, is the classic cause of actinomycotic infection. The cervicofacial region is the site most commonly affected, although that is not the case here. Thoracic actinomycosis, favored here, is a much rarer form constituting only 5-20% of actinomycosis cases². It preferentially affects young males³.

• Origin of the infection in skeleton 50/99 was most likely the lungs, with abscess followed by pleural empyema and then spread to contiguous ribs (left 9th-11th ribs here).



4a Figure 4: a. Frontal view of skull, b. Detailed view of major lesions on frontal bone



• Actinomycosis affecting the CNS can present as an abscess in the brain or subdural location secondarily spread hematogenously from the lungs¹. While this scenario could account for cranial involvement, it is likely that calvarial lesions would require more time to develop, and it is possible that bone infection was followed by fatal secondary actinomycotic meningitis.

• Frontal lesions present on skeleton 50/99 are osteolytic with scalloped borders and no sclerotic response, making them appear "punched out" (Fig 4). Many of the spheroid lesions have coalesced in this region, and absence of productive reactions suggests they were the most recent site of infection and brain involvement probably caused death.

• Although rare, cases have been reported of actinomycosis affecting the extremities⁴. This is consistent with periostitis and osteomyelitis in this skeleton.

• Severe osteomyelitis with destructive cloacae is present on both tibiae (Fig 5) and the left ulna. Periostitis is evident on the following elements: both femora, both tibiae, both fibulae, both humeri, left ulna, right radius, both os coxae, both scapulae, right clavicle, left ribs 9-11, both calcanei, and left metacarpals 2 and 4. Consistent with periostitis seen on other skeletal elements, surface vascular impressions suggesting hypervascularity are observed on the sacral ala and anterior body of L5. Intensive involvement of the appendicular skeleton supports hematogenous dissemination⁵.



Figure 5: Lateral view of proximal left tibia



Figure 1: a. Pleural view of left 10th rib, b. Detailed pleural view of left 10th rib

• Osteolytic lesions with sclerotic margins are present on the left 10th rib (Fig 1), both greater trochanters (Fig 2), and both scapular spines (Fig 3). They take on the typical form of actinomycotic lesions; spheroid in shape with reactive new bone⁴. Bone involvement is uncommon for this infection, but when present, skeleton lesions often appear to be randomly distributed⁵ as they do here.



Figure 2: Posterior view of left greater trochanter

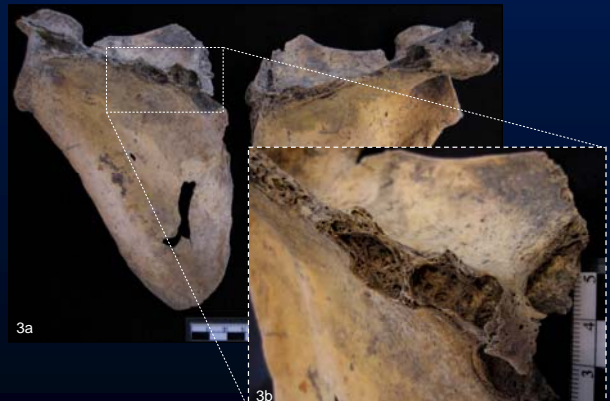


Figure 3: a. Posterior view of scapulae, b. Detailed posteromedial view of left scapular spine

Other Conditions Considered

• **Neoplastic disease-** Although the frontal lesions resemble that of a lytic meningioma as seen in Ortner⁶, it would not account for the prolific dispersal of lesions.

• **Histocytosis X-** Eosinophilic granuloma commonly affects the frontal bone, but can be ruled out because these lesions are generally solitary, very localized, mainly lytic, and without cloacae³.

• **Hematopoietic disease-** Although skull lesions present on skeleton 50/99 exhibit the typical scalloped borders seen in multiple myeloma⁵, it is excluded because the focal lesions of multiple myeloma do not coalesce or raise productive reactions as is common in actinomycosis⁴. In addition, it usually affects older individuals, almost never those under 40 years of age⁶.

• **Bacterial infection-** Bacteria of the actinomycetes group, *Nocardia*, are ruled out because infections are usually confined to the pleural cavity, and if in the rare case spread to bone occurs, no sclerotic reaction is seen⁶.

• **Mycotic infection-** Fungal osteomyelitis progresses slower than actinomycosis and so is characterized by lobulated lytic defects, smoother periosteal reactions, and less of a tendency for cloacae formation. Lesions of cryptococcosis (European blastomycosis) are mostly distributed in the metaphyses and bony prominences, and sclerotic reaction is rare⁷.

Conclusion

Actinomycosis is rarely discussed in the paleopathological literature. It is favored as the diagnosis here because the distribution and character of lesions are consistent with current understanding of actinomycotic bone involvement. A thorough description of similar cases will expand our knowledge of the effects of bacterial infections in the past.

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References Cited:

¹Smego RA Jr., Foglia G. 1998. Actinomycosis. Clin Infect Dis 26:1255-1263. ²Kinnear W, MacFarlane J. 1990. A survey of thoracic actinomycosis. Respir Med 84:57-59. ³Aulderheide A, Rodriguez-Martin C. 1998. The Cambridge Encyclopedia of Human Paleopathology. Cambridge: Cambridge University Press. ⁴Reitshchild B, Naples V, Barbian L. 2006. Bone manifestations of actinomycosis. Ann Diagn Pathol 10:24-27. ⁵Ortner D. 2003. Identification of Pathological Conditions in Human Skeletal Remains. New York: Academic Press. ⁶Kundu ZS, Bhardwaj G, Sangwan SS, Arora B. 2003. Actinomycosis of the knee: a case report. J Orthop Traumatol 4:133-135.