FOREIGN SOLDIERS AND SYPHILIS IN 16TH CENTURY ZAGREB

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Syphilis is a chronic sexually transmitted disease caused by the spirochetal bacterium *Treponema pallidum*. Based on mode of transmission it can be divided into two types: venereal or acquired, transmitted through sexual contact, and congenital, transmitted transplacentally to the developing foetus by an infected mother (Ortner, 2003).

Venereal syphilis manifests in three different clinical stages with skeletal changes appearing in the last, tertiary, stage (Ortner, 2003; Waldron, 2009). Most untreated persons fail to develop all clinical manifestations so tertiary syphilis ultimately appears in only 30% of infected persons (Holmes et al., 2007). Tertiary syphilitic bone lesions usually develop between 2 and 10 years after the infection, but may occasionally occur earlier or much later (Ortner, 2003). Syphilitic lesions often affect multiple bones with bilateral involvement, appearing on a localized area or the entire bone. The most commonly affected bones are cranial vault, especially the frontal bone, and the tibia. Changes can also appear in the ribs, sternum and clavicle as well as the other long bones (Mays, 2000; Ortner, 2003). Lesions may be gummatous or nongummatous (Mays, 2000). In many cases a combination of the two is present. Gummatous lesions develop as a result of the gummata in or adjacent to the bone. These lesions are pitted defects with rough and thin margins surrounded by periosteal new bone. Nongummatous lesions, caused by chronic inflammation, are new periosteal bone formations usually accompanied by bone thickening and obliteration of medullary canal.

While venereal syphilis is characterised by bone lesions, hallmark of the congenital form are distinctive defects of the permanent dentition: first incisors, canines and first molars (Hillson et al., 1998; Waldron, 2009). Hutchinson's incisors have a shortened incisal edge and a notch of variable shape. Characteristic trait of Fournier's canines is a sharp groove-like hypoplastic defect around the tip of the cusp. In mulberry molars occlusal surface is irregular with small protuberances.

The archaeological site of Park Grič is situated in the Upper Town of Zagreb in central Croatia. Excavations revealed 163 burials with scarce grave findings dated to the 16th century (Mašić and Pantlik, 2008). Historical sources confirm that this cemetery was used from the end of the 15th to the early 17th century (Klaić, 1982). The skeletal sample consists of 180 persons (86 males, 30 females, 46 juveniles and 18 of undetermined sex).

Macroscopic analysis of the skeletal remains discovered 6 cases of syphilis. All documented cases are described in the table. Sex and age were assessed using standard anthropological methods (Buikstra and Ubelaker, 1994). Presence of syphilis was confirmed based on standard diagnostic criteria (Ortner, 2003; Waldron, 2009). In five cases distribution and characteristics of the lesions suggest the diagnosis of venereal syphilis. All the observed lesions are of nongummatous type. The majority are found bilaterally on the long bone diaphyses. Affected bones are thickened due to periosteal new bone formation and some of them have obliterated medullary canal. The most distinctive changes are in the lower leg bones. One case of congenital syphilis was confirmed by dental defects of the first incisors, canines and first molars.

GRAVE	SEX & AGE	AFFECTED REGION	OBSERVED PATHOLOGICAL CHANGES
VENEREAL SYPHILIS			
8	male 20-34	tibiae	extensive bone thickening, new periosteal bone formation
		left fibula	extensive new periosteal bone formation
		right ulna, left femur	bone thickening
		humeri, right femur, ilia, sternum, right clavicle	new periosteal bone formation
13	male 20-34	left fibula	extensive new periosteal bone formation
		left tibia	bone thickening
		left femur	new periosteal bone formation
		cranial vault	periostitis
90	male 35-49	frontal bone	radial scarring
		left clavicle, ribs	bone thickening, obliteration of medullary canal
		right femur, sphenoid bones	bone thickening, new periosteal bone formation
		right fibula, sternum	bone thickening
		temporal bones, mandible, scapula fragment, left tibia	new periosteal bone formation
161	male 20-34	cranial vault, zygomatic bones	periostitis, bone thickening
		radii, right ulna	extensive new periosteal bone formation, obliteration of medullary canal
		mandible, right humerus, left femur	bone thickening, new periosteal bone formation
		left ulna	extensive new periosteal bone formation
		clavicles, ribs, right femur	bone thickening
		left humerus, scapula fragment	new periosteal bone formation
179	female 50+	cranial vault	periostitis
		left humerus, left ulna, tibiae	extensive new periosteal bone formation, obliteration of medullary canal
		clavicles	bone thickening, obliteration of medullary canal
		sternum	extensive new periosteal bone formation
		left radius	bone thickening
		right scapula, femora	new periosteal bone formation
CONGENITAL SYPHILIS			
55	juvenile 15-19	maxillar incisors	Hutchinson's incisors
		maxillar and mandibular incisors	hypoplastic defects at the top of the crown
		maxillar and mandibular first molars	mulberry molars
		left tibia	new periosteal bone formation

Grave 161. Layer of new periosteal bone on the tibia.

Grave 161. Syphilitic changes on the right lower leg.

Grave 90. Closed medullary canal of the left clavicle.

Six described cases are currently the earliest known examples of this disease in Zagreb, and also the only cases from the 16th century in central Croatia. Since in the 16th century Europe witnessed an extensive spread of syphilis, discovery of this disease in central Croatia does not come as a surprise. Historical circumstances facilitated the arrival of syphilis to this area.

In that time numerous conflicts, resulting from civil war and Ottoman expansion, arose in this area (Klaić, 1982). The civil war started as a result of succession claims to the Hungarian-Croatian crown. Also, the Ottoman Empire entered a long period of conquest and expansion in the 15th century. Their offensive to central Europe was temporarily stopped by European forces in several important battles around Zagreb. Both events led to the involvement of foreign soldiers from several European nations, such as Spaniards, Germans, Carinthians, Styrians, Tyroleans and Italians (Buntak, 1996). Various written sources mention military camps around the city, while a minority of soldiers were stationed in the city itself. Majority of these soldiers must have been mercenaries serving in Western Europe, where syphilis was already widely diffused. Established everyday life in 16th century Zagreb was disturbed due to described circumstances. Violent acts of foreign soldiers towards the local population made their existence very harsh. Frequent incidents included murder, assault, robbing and arson (Buntak, 1996). Their barbarous behaviour introduced syphilis to Zagreb inhabitants.

Given the war period, it is possible that both local population and foreign soldiers were buried at the Park Grič cemetery. Current data is not sufficient to clearly distinguish members of each group in the skeletal assemblage. We can only assume that some of the individuals infected with syphilis were locals, especially having in mind that one is a female and another one is a juvenile. Because syphilis is an infectious disease, its finding suggests that it was broadly present in this community. Considering that skeletal lesions appear in only 30% of infected persons, additional cases might be expected. This is supported by few additional cases of skeletal lesions suggestive but not diagnostic of syphilis. We hope that future research may provide new data and more conclusive answers.

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