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A Late Roman-period case of hallux valgus from Ashqelon, Israel

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Abstract: *A rare case of bilateral hallux valgus in an adult individual, identified as a female aged 50+ years, was identified in a Late Roman Period (4th century CE) context near Tel Ashqelon. The body, buried in a lead coffin, was covered with gold threads and had high-quality glass vessels as burial goods, attesting to the high socio-economic status of this individual, who was probably of non-Jewish affiliation. The manifestation of hallux valgus in this individual is described and discussed in the regional context.*

Key words: physical anthropology; lead coffin; Late Antiquity; palaeopathology

Introduction

The skeletal remains of an adult human individual were found inside a lead coffin uncovered at the site of Er-Rasm, southeast of Tel Ashqelon (IAA license No. A8583/2019, **Figure 1**). The burial was revealed underneath the remains of a Byzantine winepress and it was dated using associated grave goods to the first half of the 4th century CE. Gold threads that were present around the skeletal remains were apparently woven into a burial shroud or some other garment. These gold threads, along with high-quality glass vessels placed around the decorated coffin, are indications that the deceased enjoyed a high socio-economic status (Erickson-Gini et al. 2021). While the sides and cover of the decorated lead coffin were well-preserved, high ground water eroded the bottom of the coffin, contributing to the fragile and fragmentary state of the skeletal remains (**Figure 2**).

Description of the remains

The bones were in a poor state of preservation, and important diagnostic skeletal elements have completely deteriorated. **Figure 3** is a schematic illustration of the bones

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Figure 1. Location of sites mentioned in the text. Drawing by Y. Nagar.

available for the study. The remaining bones were not rinsed, but brushed-clean, and stabilized using suitable bone-consolidation glue (Glyptol, 5% concentrated). The bones were recovered in an anatomically articulated position indicative of primary burial. The deceased individual was placed on its back, in an east-west orientation, with the head towards the east and the arms extended alongside the body.

Age-at-death and sex estimations

Little remained of the skull, which is mostly fragmented. Yet, in careful sifting of the debris below the skeleton, the remains of two broken teeth were found. A small fragment of the temporal bone manifested a relatively small mastoid process, suggestive of a female.

In the pelvis, the pubic bone was completely deteriorated, but the auricular surface of the right ilium is still visible and manifests signs of advanced age (**Figure 4**),

Figure 2. Skeletal remains from Ashqelon during excavation. Photograph by E. Aladjem.

being highly porotic, with slight changes around the apex, typical of an individual aged 50 years or older (Lovejoy et al. 1985). The vertebral column is not complete, yet osteophytes measuring 1–2mm were noticed on some of the thoracic vertebrae (**Figure 5**). Although factors such as body mass, stature, and activity may contribute to the manifestation of vertebral osteoarthritic lesions, age is still considered the main contributing factor (Calce et al. 2018), being consistent with developments expected in an individual aged 40 years or older (Bass 2005:21).

In the femora, the vertical diameter of the left femoral head is 44mm, an intermediate value between male and female (Bass 2005:230), while the bicondylar width of the distal heads is 79 and 80mm (right and left sides, respectively), values more consistent with males (Bass 2005:230). In the humerus, the vertical diameter of the proximal head is 45mm (left side), an intermediate value between male and female (Bass 2005:152), while the epicondylar width of the distal head is 57mm (right side), a value more characteristic of a female (Bass 2005:153).

Pathology

The skeletal remains recovered displayed a bilaterally symmetrical pathological condition on the feet, i.e. hallucal lateral deviation, the apposition of lamellar bone, and the growth of osteophytes around the metatarsophalangeal joints of both sides. The halluces are fused with the proximal phalanges (**Figure 6**). A further fusion of the right hallux with the lateral and medial sesamoid bones, which were also laterally deviated, was also documented. An X-ray analysis revealed that the fusion between the first metatarsals and their corresponding proximal phalanges (and on the right side with the sesamoid bones as well) was smooth, suggesting a long-term fusion, rather than a trauma-induced one (**Figure 7**). This condition is referred to in modern

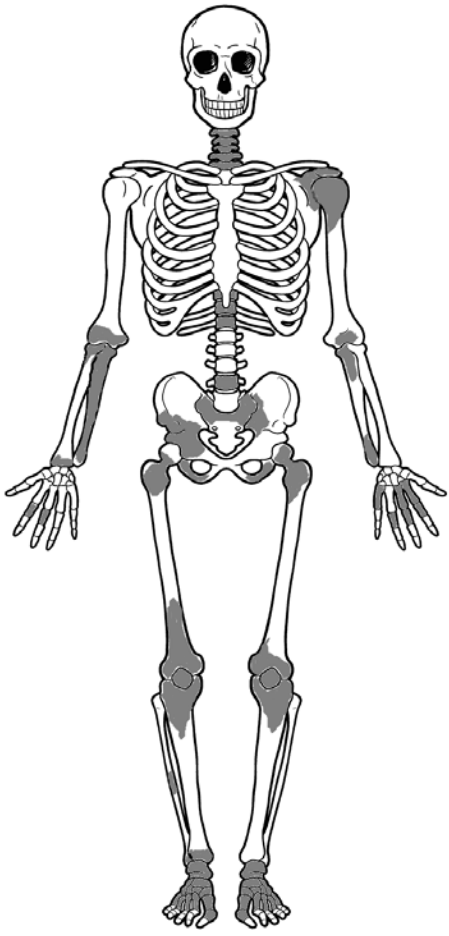

Figure 3. Completeness diagram of the skeleton. Drawing by Y. Nagar.

medicine as hallux valgus, a term used to describe an abnormal medial deviation of the first metatarsal along with greater lateral deviation of the proximal phalanx and lateral subluxation of the sesamoid bones (Mays 2005; Perera et al. 2011; Pigott 1960; Trujillo-Medero et al. 2014).

Discussion

It was hard to determine the sex of this individual since commonly utilized skeletal sex-markers were not preserved, and long bone measurements were ambiguous. Still, based on the overall gracility of the bones, the very small mastoid process, and the

Figure 4. The right pelvis. Photograph by Y. Nagar.

Figure 5. Thoracic vertebrae with osteophytes. Photograph by Y. Nagar.

Figure 6. Fusion of the first metatarsals with the proximal phalanges; (a) left side, dorsal view; (b) right side, plantar view. Photograph by Y. Nagar.

Figure 7. X-ray picture of the bilateral hallux valgus in the antero-posterior plan. Photograph by S. Borgel.

narrow epicondylar width, a cautious identification as a probably female was made, an identification which may be circumstantially further strengthened by the grave goods recovered from this burial (Riggs 2008). The bones manifest old-age indicators such as vertebral osteophytes and chronological changes in the iliac auricular surface, characteristic of an individual aged 50+ years.

Both feet suffered from fusion and abnormal deviation of the big toes, suggesting hallux valgus. Considered a common pathology in modern adults (ca. 23% in individuals aged 18–65, and 36% in individuals aged 65+ years) (Coughlin & Jones 2007; Nix et al. 2010), and historical populations (ca. 20% in a large sample from France; Mafart 2007), it affects women in particular, with a ratio of 15–17 women for every 1 man affected (Nery et al. 2013; Perera et al. 2011). In the paleopathological record, several cases of hallux valgus are mentioned, from Medieval populations from England (Bruckner 1998:44, Mays 2005) and Slovakia (Tonková et al. 2013), historical populations from France (Mafart 2007), and even one case from a Middle Paleolithic population in the Levant (Arensburg 1985).

Although this pathology can be congenital with a maternal transmission (Caughlin & Jones 2007; Piqué-Vidal et al. 2007), most cases are acquired. They develop in adults between their third and fifth decade and result from constriction of the feet by shoes (Caughlin & Jones 2007; Mays 2005; Perera et al. 2011). Of these two factors, family history is the stronger contributor to the likelihood of hallux valgus development (Caughlin & Jones 2007; Piggott 1960). Furthermore, the biomechanical process leading to the pathology (i.e. tight shoes), described by Mays (2005), might not be particularly relevant for individuals who lived in Roman-period Ashqelon, where open sandals would almost certainly have been more common than year-round tightly worn shoes.

The main consequence of hallux valgus is the failure of the toe to fulfill its role in weight-bearing and its inefficiency in push-off during gait (Mays 2005). In addition, a painful bursa may develop on the medial part of the metatarsal head and an exostosis (or bunion) may develop (Mitchell et al. 1958; Weinfeld & Schon 1998). Hallux valgus deformation can also lead to metatarsalgia, a condition in which the plantar ball of the foot is inflamed and painful (Caughlin & Jones 2007), and to degenerative arthritic changes, affecting the metatarso-phalangeal joint contour (Weinfeld & Schon 1998).

In the present individual, the massive presence of osteophytes observed at the joints, and their fusion, are suggestive of an arthritic, degenerative change due to prolonged hallux valgus, likely present for many years before death. This is in accordance with the smooth fusion observed in the X-ray scan, and the symmetric bilateral expression of the pathology, which are all in favor of a congenital explanation in this case (Caughlin & Jones 2007).

Table 1. Burials in lead coffins.

Site	Reference	MNI	Posture	Age (yrs)	Sex
Ashqelon Barzilay (6878)	Eisenberg-Degan 2017	1	?	5+	?
Ashqelon El-Jora (A-2033)	Wallach 1998	1	?	40+	?
Ashqelon Horvat Hammama (A-8156)	Nagar forthcoming	1	?	15–20	?
Horvat Ohad (A-3903)	Varga & Talgam 2013	1	primary	17–20	F
Horvat Milekh (Caesarea)	IAA archives	1	?	6–8	–
Motza Road 1 (A-8613)	IAA archives	2	primary	7–9	–
			on the back	60+	M

In terms of the burial itself, more than thirty lead coffins of the Late Roman period found in Jerusalem and the coastal plain of Israel have been described by Avi-Yonah (1934) and Rahmani (1987). Based on the archaeological context, coffin decorations and grave goods, these burials were attributed to the non-Jewish population of ancient Israel, however, no skeletal remains were described by these authors. Although relatively rare in comparison to other burial customs, five more cases of burial in lead coffins have been uncovered in recent years, all dated to the Late Roman period. In these newly-discovered burials, the skeletal remains were analyzed by an anthropologist, and although some cases were not yet published, reports may already be found in the anthropological archives of the Israel Antiquities Authority. The results of the anthropological analyses are summarized in **Table 1**. According to these data, this type of burial was used for both children or adults, males and females, indicating no specific pattern of sex or age-based preference in use. Another lead coffin from Ashqelon, reported by Wallach (2000), was found between two cyst graves. However, although bones were found over the coffin (an adult male), they could not necessarily be associated with the coffin and thus cannot be added to these statistics.

Gilded shrouds to cover the bodies of deceased women in burial are known to have been utilized among the elites of Ptolemaic Egyptian society in the Hellenistic and Early Roman periods (Riggs 2008). Therefore, the discovery of a gilded cover around a skeleton identified as an elderly female in Late Roman Ashqelon is not surprising. While an interesting component of burial variation in the present case from Ashqelon, a detailed examination of such variation is beyond the scope of the present study and will be presented separately in a future detailed study.

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