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PALEOPATHOLOGY AND ITS CONTRIBUTIONS TO THE DECIPHERMENT OF THE HUMAN CONDITION IN ANTIQUITY: A PRELIMINARY REPORT FOR THE CASE OF TWO SKELETAL POPULATIONS FROM MALLOURA IN CYPRUS

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Preface

This paper presents archaeo-anthropological results of forensic and paleopathological investigations concerning two chronologically diverse human skeletal populations excavated from the site of Malloura, in Athienou, Cyprus. Part of a larger cross-disciplinary project, this endeavor introduces some of the inherent difficulties and peculiarities faced by the physical anthropologist/paleopathologist in his pursuit to reconstruct aspects of the human condition during antiquity. Here, despite the limitations of preservation, an attempt was made to better decipher and interpret diachronic conditions of human adaptation.

Introduction

The two skeletal populations were unearthed from the archaeological site of Malloura. The first collection has been dated to the Classical/Hellenistic periods (5th century-2nd century B.C.), and the second to the Venetian Era (ca. the 16th century A.D.). The earlier collection was recovered from an elaborate tomb, designated by the archaeologists as royal Tomb # 27, carved in the hardy sediments at the foot of a hill — part of the site’s natural environment, adorned with structural decorations and sculptures, and covering a considerable subterranean internal surface and volume. The latter collection was unearthed from the open site burial ground # 6, adjacent to other activity areas of the Venetian Era site.

Unfortunately for the antiquities and subsequently for all of us, grave robbers had looted the royal tomb during the Ottoman occupation of the island (Cesnola 1878). The human interments were systematically raped from their valuable artifactual belongings. As a consequence of these anthropogenic, intrusive, and destructive activities, the numerous human skeletal remains which were interred in the tomb had been stepped on, crushed, pushed at the side and removed from their original contextual associations (Agelarakis 1996).

Archaeological excavations in the royal Tomb # 27, brought to light a situation, difficult to describe, in the sense that not a single skeleton had been left intact, and/or in a relative anatomical positioning (personal communication with M. Toumazou). In a complex process to methodically salvage all data that could be recovered from the human osseous record, the skeletal remains were excavated as discrete and sequential units, according to the co-ordinate designations of a typical grid-system of archaeological reckoning, superimposed on the esoteric areas of the royal tomb. Several months of zealous work with archaeologists hanging on prone positions, suspended from scaffolding constructed in the interior of the tomb chamber (personal communication with M. Toumazou), produced 178 artificial entities of small skeletal units (Fig. 1).
Fig. 1. Preservation of Skeletal Individuals in reference to Crania, Teeth, and Post Crania.

Fig. 2. Sex Assessments concerning the Royal Tomb Skeletal Individuals.
The burial ground of Malloura, of the Venetian Era, was better preserved as a site. The burials had long been unmarked, as a consequence of weathering, and taphonomy. Further, it was common knowledge that the individual graves of the Christian Era did not contain interments which were adorned with riches and burial goods. However, other kinds of human activities had seriously damaged these burials, namely the long term plowing of the fields for agricultural purposes. Archaeological excavations of the Venetian Era burial ground yielded 39 very fragmented and often incomplete, but discrete collections of bones, analogous to the number of individual burials excavated (Fig. 1).

Methodological approaches

In trying to coax out of the skeletal record a plausible decipherment of the information contained by the dry bones, a combination of a physical anthropological and paleopathological study was imperative (Agelarakis 1977a; Bordens, S., and B. Abott 1991). Anthropological field laboratory analyses started during the summer season of 1992, in Malloura. Initial laboratory processes proved to be time-consuming as they involved inventorying procedures, and meticulous processes of cleaning, consolidation, and preservation of the fragmented human osseous remains especially these of the royal Tomb # 27 (ibid). Extensive laboratory studies focused on, but were not limited to, the detection and scoring of anatomical morphocharacteristics (van Vark, N., and W. Schaafsma 1991) and traits of epigenetic variation (Berry, C. and J. Berry 1967; Finnegan 1978; Saunders 1989), through macro- and microscopic observations, as well as the assessments of palaeopathological (Ortner, J., and W. Putschar 1981; Mann, R. and S. Murphy 1990; Steinbock 1976) and mensurational data (Stewart 1979) for determining and reconstructing “original” skeletal individuals. This was achieved, to an extent, by lumping bone fragments showing mending surfaces, teeth and alveolar surfaces identified according to their developmental state, function, wear patterns, and pathogenesis (Agelarakis 1997). Only in very few cases, however, was it possible to reunite teeth with their appropriate alveolar loci. Further, using existing metric discriminatory function analyses for post crania, it was feasible to evaluate components of the demographic profiles of both populations (Bernard 1994; DiBennardo 1986; El-Nofely, A. and Y. Iscan 1989) including but not limited to sex and age assessments.

Results

Physical anthropological and paleopathological studies of the royal tomb’s skeletal population revealed aspects of its demographic profile (Angel 1969; Hassan 1981) showing 102 individuals out of which 53 were males, 37 were females and 12 were of indeterminate sex due to the incomplete state of preservation and/or immature skeletal bodies (Fig. 2). Further determinations and tabulations of demographic information revealed a distribution of the age at death showing the highest prevalence among the “Other Adults” — (between 18-45 years), and “Late Adults” — (35-45 years), see Fig. 3.

Studies in osseous morphology indicated an accentuated sexual dimorphic pattern between sexes, showing well-built, robust, skeletal bodies for the male individuals with emphasized muscular imprints in contrast to comparable female skeletal landmarks and loci which were characteristically gracile. Paleopathological analyses further revealed a prevalence of certain manifestations of disease which, permanently marking the fragmentary dry bone and dental surfaces, had endured the post mortem trials of time. Considering the incomplete state of preservation of the human skeletal bodies, permanent markers of physiological and pathological stress could only illustrate a random range of variation of the nature and diversity of diseases and conditions of stress which had affected the osseous tissues of the population involved. Hence, it is of importance to identify that osteoarthropathies and spondyloarthropathies were the major osseous changes detected on bone surfaces (Zarek 1966) (Fig. 4). Morphocharacteristic changes observed at relative loci of attachments, origins and insertions of both synergistic and antagonistic muscles — as trajectory points of stress (Currey 1984; Levi 1972) relative to the appendicular skeletons, were discriminatively more emphasized among males. These determinations were in concurrence with degenerative spon-
dylo-osteoarthropathic changes, coupled by axially oriented stress events that had caused trauma—such as Schmorl's nodes imprinting the supero-inferior surfaces of the vertebral bodies, which had affected with a higher prevalence the males compared to the female individuals. Additional pathogenetic changes were scored with diminishing values in the following sequence: dental calculus deposits, cervical cariogenic lesions (Darling 1970), and periodontal disease (Martin 1971; Pindborg 1970). Studies of abrasion and attrition of dental surfaces indicated relatively homogeneous horizontal wear patterns of incisal edges and occlusal platforms showing a distinct absence of cracks and/or flaked off dental enamel chips. Dental linear enamel hypoplasias, or LEH, (Grahnen 1967 and 1969; Huss-Ashmore 1982; Pindborg 1982; Rose, C., G. Armelagos and C. Lallo 1978; Rose, C., K. Condon and A. Goodman 1984), identified as permanent markers of early life stress were exceptionally rare. Each LEH might indicate an episode of temporary systemic cessation and subsequent continuation of biological growth affecting the enameloblasts due to a variety of plausible causative agents such as childhood diseases, malnutrition, undernutrition and/or in combination with trauma, seasonal environmental stress factors, and more. The few cases of LEH had affected the early childhood rings (assessed to have occurred between 1.5 to 3.0 years of age) of dental crowns of older individuals, hence indicating that the individuals had survived the incident of stress.

As mentioned above, the archaeological contexts of the human remains unearthed from the burial ground of the Venetian period had not been disturbed intentionally, but rather because of land use related activities. Nevertheless, the skeletal structures although maintaining better contextual and anatomical associations, when compared with the royal Tomb # 27, were preserved in an incomplete and fragmented state, the cranial and dental remains having suffered the most (Fig. 1).
Fig. 4. Osteoarthropathies and Spondyloarthropathies affecting the Royal Tomb Individuals.

Fig. 5. Sex Assessments concerning the Venetian Period Burial Ground Individuals.
Here, all cortical surfaces of the recovered bone structures had been weathered significantly, having been subjected to the environment of the open site and the relative taphonomic processes, specifically those of the abiotic environmental components (Shipman 1981, Sognaes 1963). Such ecto-cortical morphological and structural changes —mainly of the collagenous composition, of the osseous materials limited the abilities of the paleopathologist to better detect, accurately describe and assess the nature and causative agents of manifestations of disease and conditions of ante mortem stress.

This skeletal population discerned the presence of 43 individuals. Sex assessments indicated the presence of 10 males, 10 females, and 23 indeterminate individuals due to the incomplete state of preservation and/or immature skeletal bodies (Fig. 5). Additional evaluations of the demographic data showed a varied distribution of mortality ratios per age subgroup with the greatest prevalence scored among the “Young Adults” —(18-25 years), followed by “Other Adults” — (between the ages of 18-45 years), and subsequently trailed by the “Infancy I” age subgroup (0-6 years) (Fig. 6).

Studies in skeletal morphology indicated relatively well-built, robust, osseous structures with upper and lower extremities’ muscular imprints characteristically emphasized among males, however inclusive for the females only in reference to certain muscular systems of extension and flexion of their upper extremities —probably related with processes of food production. Further, palaeopathological analyses revealed permanent markers of stress on dental and bone surfaces. Four cases of porotic hyperostosis affected cranial vault fragments of younger individuals age-assessed within the “Infancy I”, and “Infancy II” age subgroups. Porotic hyperostosis might indicate systemic hemopoietic disturbances due to hereditary and/or acquired anemias, parasitic infestation, and living conditions of aggregate. Dental enamel hypoplasias (LEH) were also prevalent, affecting the dental childhood rings of both infants and adults. Wear patterns of dentitions indicated heavy loss of dental surfaces, infra gingival calculus deposits coupled by periodontal disease, and many cases of ante mortem flaked off enamel chips reflecting on dental hygiene, and the “roughness” of the foods consumed on masticatory apparatus.

Sporadic cases of post cranial trauma (Courville 1967) affecting the lower extremities —specifically the tibiofibular and tarsophalangeal structures, spondylo— and osteoarthropathic changes indicated a rather discriminatory distribution between sexes affecting males with a significantly greater prevalence compared to females (Fig. 7). Parenthetically, it should be mentioned that a singular case of a hydatid cyst, measuring a minimum of 3.5cm. in maximum length, had affected a female individual age assessed between 44 to 55 years, manifesting a case of zoonotic, parasitic, infestation by tapeworm, usually Echinococcus granulosus, see Thomas (1985).

Discussion

The intrasite, diachronic, study of two human skeletal collections provided a good opportunity to create a window into the past, a nexus with the human condition, based on data preserved through time in the skeletal record of the inhabitants of Malloura. It was possible to coax out of the skeletal record conditions reflective of the demographic and epidemiological profiles of each collection thus elucidating aspects of their living conditions, their physical, social, and normative environments. Further, the anticipated prospect was almost within reach —to establish a diachronic record, however limited, of any similarities and/or differences between these cultural components.

From a general taphonomic point of view, specifically in reference to the preservation of the osseous record, anthropogenic activities, intentional and/or unintentional, perilously affected the two sites, both collections having sustained severe impacts (Fig. 1) through time. The post cranial remains sustained the least loses, showing the greatest prevalence of preservation, even though in fragmentary form, followed by the cranial remains which showed a moderate loss of their structural components, and finally trailed by the dental remains especially those of the royal tomb. In evaluating the prevalence of mortality ratios affecting the different sex and age subgroups of the populations involved, the demographic pro-
files of the two collections revealed differential values (Fig. 8). A high prevalence of “Prenatal” and “Infancy group” morbidity, punctuated at the “Infancy I” age group dominated the demographic profile of the Venetian period indicating harder times for the prospects of survivorship and progeny for this population relevant to conditions of early life stress which affected this segment of the population in contrast to the Classical-Hellenistic collection.

It seems that during the Venetian period the Malloura population was either less well prepared as far as their cultural buffer mechanisms were concerned for encountering, withstanding, and possibly overcoming manifestations of stress, and/or coupled by pathological/epidemiological challenges resulting from the nature of their physical and social environments (Butzer 1989). This coincided with the paleopathological manifestations of the numerous dental linear enamel hypoplasias and the cases of cranial porotic hyperostosis which particularly affected the “Infancy I” age group. However, the highest prevalence of mortality during the Venetian time period could be detected within the “Subadult” age group of the population, especially affecting females; a phenomenon that it is suggested could have been prepared by the events of early life stress, as reflected through the cases of LEH, but primarily associated with a variety of stress conditions sustained during their childbearing years. In comparison, males displayed a linear continuum of prevalence of mortality, between the “Subadult” to the “Late Adult” years, revealing its highest accentuation during both their “Subadult” and “Young Adult” years, possibly related with age cohorts most demanding in physical activities of endurance and persistence, including these of polemic nature.

Aspects of the demographic profile of the Venetian period were distinct from these of the Classical-Hellenistic periods. The latter apparently seemed to have enjoyed a rather longer life span,
Fig. 7. Osteoarthropathies and Spondyloarthropathies affecting the Venetian Period Individuals.

Fig. 8. Comparative Age/Sex Assessments of the Venetian, and Classical/Hellenistic Periods.
showing punctuations of death occasions for both males and females in their later years, starting from the "Middle Adulthood" and ascending to the greatest punctuation during the "Senilis/Older" age subgroup. Dental paleopathological data were further supportive of this argument, showing a near absence of LEH, indicators of early life stress markets, from the associates of the royal tomb. Further, although masticatory surfaces of both populations were affected by wear patterns and dental pathologies the degree of severity of the manifestations documented among the individuals of the Venetian period was significantly more accentuated. This reflected on the dietary intake and attributes of the preparation of foods consumed which were most definitely of higher quality for the Classical to Hellenistic population.

Despite the disparate facets of demographic values, as described above, there were also certain similarities between the two cultural components as revealed by features of skeletal biology, morphology, and pathology. Specifically, a significant sexual dimorphism in bone robustness observed among the Classical to Hellenistic males and females was clearly traceable during the Venetian period indicating a continuum of the cultural "filter" which must have interfered with the involvement of females in rigorous bodily exertions and/or strenuous physical activities that would require the involvement of both upper and lower extremities. Similarly, a discernible discriminatory distribution of degenerative spondyloarthropathic and osteoarthritic changes had predominantly affected the male individuals of both populations.

Although the nature of osseous manifestations (including osteoblastic responses, robustness, and degenerative changes) in skeletal populations might reflect on a variety of gene pool/genotypic information, physiological growth processes (not limited to nutrient intake or disease), and environmental essentials, it might also mirror on behavioral circumstances implicating a variety of ante mortem, daily physiological external and internal stimuli and/or conditions of stress which would stimulate a physiological osseous response by this flexible organ —bone.

So far the preliminary information derived from the osseous record allowed for reconstructions of facets of the undocumented past in Malloura. Inherited conditions relevant to taphonomy and the state of preservation, in addition to esoteric limitations or impositions reflected in the skeletal record, as often dictated by the cultural and physical milieu of the respective time periods, may have further imposed certain limitations to the epistemological contribution expected by the fields of Physical Anthropology and Paleopathology. Nevertheless, such unavoidable obstructions would not restrain the quest for continuing to seek better methodological approaches and techniques in order to circumvent such inherited difficulties (Agelarakis 1992).

Having launched an exploratory research process, it remains vital to pursue new pathways that will secure broader and more detailed aspects of life in Malloura, such that would entail, but wouldn't be limited, for example, to a better comprehension of basic issues concerning the human ecology of the "commoners" of the Classical to Hellenistic periods, and/or of the individuals of an anticipated "social superstructure" of the Venetian period (Agelarakis 1992a).

Although we might never attain a completely holistic and pragmatic view of the human condition during antiquity, it is the conviction of this author, that continued inter—, and cross disciplinary research efforts will allow for constructive and multifaceted understandings of the undocumented prehistoric and historic records of our ancestors in Cyprus.


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