

The Importance of Anthropology and Paleopathology in the Study of Congenital Malformations: Problems in Interpreting Archaeological-Anthropological Specimens

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Introduction

Congenital malformations are very important in foetal-neonatal and paediatric pathology. Today, the results of accurate morphological investigations must be closely related to genetic information and extensive biological databases, especially in view of changes in environmental and population conditions. In addition, multidisciplinary collaboration is increasingly required in medical and biological research in order to monitor and limit the malformations.

Anthropology and paleopathology are valuable assessment tools in an innovative approach to the biological-naturalistic study of congenital malformations. These disciplines provide a historical understanding of malformations: they draw conceptual and technological tools from pathological anatomy, which are used to analyse skeletal lesions and infer their clinical meaning. They also provide a broad geographic and temporal picture of congenital malformations, from proto-history to our more recent past.

The frequencies of congenital malformations, like those of other diseases, have probably changed in time, partly under the influence of microevolutionary factors: diseases are often the consequence of selection by the environment (artificial and natural) (Fulcheri, 1982; 1988; 1989).

Knowledge of the incidence and forms of congenital diseases in the past means knowledge of a population's normal and pathological genetic load, as well as a certain ability to predict their behaviour and development in the present. It could also mean being able to identify factors that did not exist in the past but now play an important role in mutations and alterations of the genetic patrimony. The serious problem of pollution from chemical or physical agents could be better understood not only by defining their damage today but also by evaluating if such damage was the same, less frequent, sporadic or absent in past periods when such agents were virtually absent. Historical and prehistoric human skeletal remains from archaeological excavations are the subject of anthropological and paleopathological investigations.

Problems of interpretation

The study of an ancient bone is subject to limitations and problems imposed by the archaeological context, the

morphogenesis and anatomy of the bone, and the type of damage being studied.

Limitations imposed by the archaeological context are related to natural and artificial events, such as:

selection at the time of burial due to differential organization of the sepulchral spaces (family, infant, privileged, plebeian graves); natural or artificial circumstances during burial (tampering and/or re-use in antiquity); possible selection at the time of recovery (incomplete or trial excavations). These events can alter the representativeness of the sample, in terms of sample size and randomness of sampling;

the action of taphonomic processes (physical, chemical and biotic) acting on organic remains before, during and after burial of the body; by altering or in some cases destroying the skeletal components, they compromise the qualitative (bone quality) and quantitative (anatomical preservation, bone representation) preservation of the remains. This affects the collection of paleodemographic, osteometric, paleopathological and paleoepidemiological data (Bello, 1999-2000; Littleton J., 2000).

The limitations imposed by the archaeological context also include strictly contextual situations that can reduce or limit paleopathological interpretations of the data:

the lack of isochrony among specimens, even for those that are well dated stratigraphically;

the alternation of several generations of the same family in the same burial ground;

the geographical/territorial position of the site and thus its use as the cemetery of a village (local population), of a monastery (heterogeneous group, not necessarily local), etc;

the type of discovery (single or multiple grave, ossuary, filling, etc.).

Limitations imposed by the morphogenesis and anatomy of the bone include morphological and morphogenetic characteristics of bone that can negatively affect the quantity of recordable data, such as:

the different distribution of spongy and compact bone, which provides the bone with differential resistance to taphonomic agents;

the stages of skeletal maturation, from appearance of the ossification centre until complete ossification, which lead to the morphological stability of the adult skeleton.

Limitations imposed by the type of damage being studied:

the presence of the skeleton alone strongly limits the epidemiological study of malformations: only 40% of

malformations involve the skeleton, which means that more than half of all current malformations cannot be identified in ancient populations only on the basis of osteological studies. Nevertheless, having only the skeleton is not a limiting factor in the study of arthropathies or enthesopathies, or in studies of dental pathology; the study of malformations that are incompatible with life (spontaneous abortions or stillbirths) or incompatible with long survival (deaths in infancy) require specimens usually not found in an archaeological context due to the fragility of incompletely mineralised bones or even their absence.

The recovery of ancient skeletal remains and basic paleopathological studies are not sufficient by themselves. It is also necessary to use appropriate methods of

investigation that can only be developed with specific and detailed targets.

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