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"A case of bifid rib from the G. Marro" egyptian osteological collection

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Abstract

The study was conducted on a skeleton belonging to the "G. Marro" Egyptian Anthropological Collection. The skeleton came from a single grave at Gebelein (Upper Egypt); the archaeological evidence dates it to the Dynastic period. The skeleton is well preserved and complete in all its anatomical parts. The remains are referable to a child of around 4 years. The excellent state of preservation of the skeleton allowed a detailed macroscopic study of all the skeletal regions, which revealed a congenital defect of the right fourth rib: anterior end of the rib is bifucated. The present case documents a skeletal malformation rarely observed in archaeological material.

Introduction

The present study is part of the "Anthropological Archive" research program initiated several years ago in the Department of Animal and Human Biology, University of Turin. The program was conceived as a systematic approach to the analysis of ancient human specimens from a historical, palaeodemographic and palaeo-epidemiological perspective. Its aim is the reconstruction of past environments and populations through the selection, recording and analysis of significant biological traits (Fulcheri, 1989, 1991, 1996).
Palaeopathological studies are increasingly focused on identifying diseases in circumscribed geographical areas and establishing pathogenetic relationships with the environment and with socio-biological conditions (pathocoenoses). Thus, investigations of the natural history of diseases in certain populations can help us to better understand their diffusion and their decline (Fulcheri, 1988, 1997, 1999; Fulcheri et al., 1997).
The epidemiological study of malformations and developmental pathologies is very important in this field. The aim of such analyses is to identify: causal or concausal relationships between the congenital malformations and the environment (natural or artificially modified by man); the daily habits of the population (diet, work activities, exposure to toxins or pollutants); populations with a high genetic load.
The present case documents a skeletal malformation rarely observed in archaeological material.

Material

The study was conducted on a skeleton belonging to the "G. Marro" Egyptian Anthropological Collection (Museum of Anthropology and Etnography of Turin). This collection is of great scientific value: it is fourth in the world in importance and size, but first in terms of research carried out on it. It consists of mummified specimens (80 heads and 20 complete mummies) and bones (650 complete skeletons and 1300 isolated skulls).
The anthropological specimens were collected during excavations of the Italian Archaeological Mission in Egypt (1903-1937), under the direction of the archaeologists E. Schiaparelli and later G. Farina, directors of the Turin Egyptian Museum, with the collaboration of the anthropologist G. Marro. The specimens originate from Asyut (the ancient Lycopolis), on the left bank of the Nile in Middle Egypt, and from Gebelein, on the left bank of the river in Upper Egypt, a little south of Thebes. The Asyut graves are referable almost exclusively to the I Intermediate Period, between the VI and XII dynasty (2300-1750 BC); those of Gebelein are from the Predynastic (4500-3000 BC) and Dynastic periods, between the V and XI dynasty (2450-1955 BC).
The skeleton under study (GED 44, E22, drawer 400) came from a single grave at Gebelein; the archaeological evidence dates it to the Dynastic period. The skeleton is well preserved and complete in all its anatomical parts. On the basis of past anthropological studies and subsequent reviews, the remains are referable to a child of around 4 years.
The excellent state of preservation of the skeleton allowed a detailed macroscopic study of all the skeletal regions,

which revealed a congenital defect of the right fourth rib: the anterior end of the rib is bifucated with an angle of about 40 degrees, (Fig. 1).

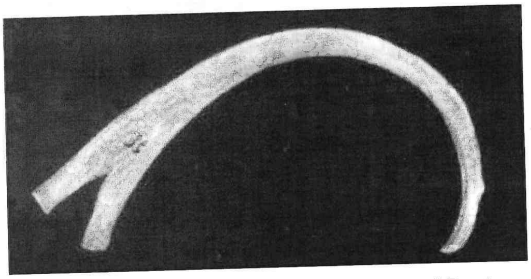

Fig.1 - Bifid rib (GED 44, E22, drawer 400, from "G. Marro" Egyptian Anthropological Collection, Department of Animal and Human Biology, University of Turin).

In addition to bifid rib, the palaeopathological screening showed persistent opening of the posterior arch of the first cervical vertebra. Given the young age of the subject, we could not surely state that we were dealing with a gap in the arch of the atlas. Therefore, we considered the lesion an alteration (delay) of the timing of ossification of the atlas with respect to the other vertebrae.

Discussion

In the specialist literature, bifid rib is also known as bifurcated or forked rib. Morphogenetically, it is a defect of embryonic development of the axial skeleton due to irregular segmentation of the ribs. According to the palaeopathological literature, it is included in the field defects of the paraxial mesoderm, which can induce alterations of the ribs, vertebrae and associated parts of the skull.

The paraxial mesoderm is mesenchymal tissue that forms on both sides of the notochord in the earliest embryonic stages. In subsequent developmental stages, the mesoderm is segmented to form the metameres (or somites). Through further differentiation, the somites give rise to different types of tissues, including the sclerotomes from which originate the ribs, vertebrae and some parts of the skull.

According to the specialist literature, costal segmentation defects most frequently involve the third, fourth and fifth ribs, with a higher incidence on the right side.

Irregularity in the formation of skeletal segments due to segmentation defects can produce many types of costal malformations, as reported hereafter according to the classification of Barnes (Fig. 2).

In the palaeopathological literature, situations of irregular costal segmentation have been recorded in various American populations (Brues, 1946; Miles, 1975; Merbs and Euler, 1985, cited by Barnes, 1994).

The same skeletal deformity has just been described on the Egyptian Collection "G. Marro" by Satinoff (1968). Two skeletons of adult males exhibit bifid ribs and other skeletal

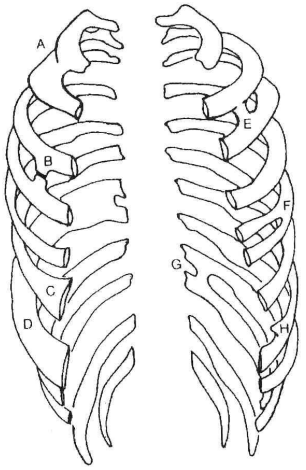

Fig.2 - Classification of Barnes. Variations of irregular segmentation of the ribs: a) fusin; b) partial bridging or articulation; c) flaring; d) wide; e) bridging; f) bifucartion; g) bridging at vertebral end; h) rib spur. (Barnes, 1994)

features such as cyst in mandible, some degree of hypertelorism and moderately broad nasal root, asymmetry of occipital bone, shortening of the 4th metacarpals, failure of the dorsal laminae of sacrum to meet in the median plane.

According to the author, these features are compatible with those of the Basal Cell Naevus Syndrome. An important early description of it was given by Gorlin and Golz (cited by Satinoff, 1968). The Syndrome is a genetic abnormality probably transmitted as an autosomal dominant trait with incomplete penetrance.

According to medical literature, the basal cell *naevus* syndrome is characterized by major manifestation such as multiple basal cell carcinomas, jaw cysts, palmar/plantar pits, intracranial calcification, spine and ribs anomalies (Kimonis et al., 2004).

Conclusions

A new case of bifid rib is described from the "G. Marro" Egyptian Osteological Collection. Although the phenotypic expression of this defect is an evident bony dismorphology, it is not associated with any other skeletal alteration in the axial or appendicular skeleton.

In absence of other major skeletal features, the relative significance of the bifid rib in the young child remains unclear. Nevertheless, bifid ribs should be considered a major criterion of great help in establishing a diagnosis of nevoid basal cell carcinoma syndrome, particularly in young children (Veenstra-Knol et al., 2005).

A noteworthy point is the fact that almost all of the skeletal remains come from the excavation sites of Assiut and Gebelein, thus endowing a certain homogeneity to the collection, which is important from the genetic point of

view in the study of certain characteristics which are believed to be inherited.

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