RESULTS AND DISCUSSION

New bone formation and porosity:
- Skeleton well preserved from a fetus/newborn - on both pars lateralis, pars petrosa, pars basilaris, right clavicle, right ischium (left bones are absent) and in some long bones (see red circles in the right hand side).
- Commined bones belonging to a MINI of 7 individuals aged less than 1 y. o. (8/23=33%). No bone lesions were identified on the remaining individuals (15/23=65%).

The differential diagnosis includes conditions such as anemia, rickets, trauma or infections and the coexistence of them is possible too.

The distribution pattern and characteristics of the bone lesions suggests a metabolic etiology.
In the individual found in articulation the lesions are bilateral and among the comminced bones are greater wings of sphenoid affected, a pathognomonic indicator of scurvy3,4.

Avitaminosis is in the core of the most common childhood diseases in Europe up until the 18th century, generally related with an unvaried diet, unbalanced in proteins. The mining environment should also be considered as a potential factor to unhealthy living conditions5. The pathologic lesions visible in so young individuals also reflect the nutritional deficiencies of the mothers. Pregnant women with scurvy and ischemia in hand bones give birth to children with scurvy6. In addition, breast milk contains high levels of ascorbic acid7. Although this pathology is commonly associated with non-adults8, especially younger infants9, vitamin C deficiency rarely occurs in infants younger than 4 months10.

Rickets is, likewise, suggested by severe mechanic deformities that occur during growth, particularly between the 6 and 24 months of age, rare in children with less than 4 months. This condition is caused by the transference of vitamin D from the mother to the fetus/newborn during the gestational period, through the placenta, which is accumulated in the nursing’s liver and, after birth, by breastfeeding11. Vitamin D deficiencies during pregnancy may have long-term consequences in the bone health of the offspring, especially in adulthood12.

Anemia is generally associated with cibra orbitalis and porotic hyperostosis13. These lesions are not pathognomonic of iron deficiency and could indicate other conditions such as hypovitaminosis B14. Up until the 3-4 months of age, the newborns have sufficient iron reserves to meet their needs15. Amongst the consequences of a malnourished mother is the high risk of abortion, premature birth, birth complications raised by the physical and mental weakening of the mother, pre-natal mortality and morbidity, low birth weight, deficient immunity of the infant and higher risk of infections, caused by an inferior volume of breast milk16.

Malnutrition results in an increased risk of illness and death among pregnant women and newborns17. Although it compromises the development of the fetus, it rarely is the direct cause of death, contributing, nevertheless, to neonatal mortality by increasing the risk of asphyxia at birth and infections (sepsis, pneumonia and diarrhea)18. These causes of death are present in World Health Organization data19, along with congenital abnormalities.

The pathologies caused by hypovitaminosis are the most common between 1 and 4 years of age, whereas infections and parasitosis are responsible for the majority of deaths in infants under 1 year20.

The data provided by the scientific literature are insufficient to establish a clear connection between the possible causes of death in foetuses/newborns and the lesions identified in the bones. As has been noted21 in bioarchaeological studies, the causes of morbidity and mortality in children have been neglected.

FINAL COMMENTS

The presence of infants skeletons is archaeological/historical samples is common due to the high mortality found in this age group. However, many skeletons do not show macroscopic lesions to allow a paleopathological diagnosis. In opposition, in this study 35% of the individuals presents new bone formation in some of their bones.

The characteristic and pattern of the lesions were considered in the differential diagnosis of conditions such as rickets, scurvy, anemia or infections suggesting a metabolic etiology, most probably scurvy. Both paleopathological and clinical literatures highlight the rarity of such conditions during breastfeeding, even in severely malnourished mothers. Even so, a weak health status associated with poor hygiene and nutrition indirectly influenced the risk of stillbirth.

Commined bones are particularly challenging for paleopathological diagnosis and to age at death estimation. The growth pattern in the past may have been different from modern populations from which methods were developed and thus there is a risk of misestimation, namely of age underestimation.

Moreover, paleopathology faces huge difficulties to interpret infants mortality based in a few number of diseases known to leave bone lesions, particularly during the first months of age.

REFERENCES