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ORAL PRESENTATION – O30

3D IMAGING OF MASS GRAVES IN HISTORICAL CONFLICTS: ENHANCING DIAGNOSTIC AND ANALYTICAL POTENTIAL IN BIOANTHROPOLOGY

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Background: Background Mass graves, particularly those associated with historical conflicts, represent complex archaeological and anthropological contexts in which preservation issues, ethical constraints, and limited accessibility often hinder analysis. In such contexts, traditional macroscopic approaches are frequently insufficient to fully characterize skeletal lesions, especially when remains are fragmented, fragile or inaccessible. Recent advances in three-dimensional (3D) imaging, including CT and micro-CT scanning, provide new opportunities to overcome these limitations through non-destructive investigation, high-resolution internal analysis, and digital preservation.

Objective: This study explores the contribution of 3D imaging to the analysis of human remains from mass graves, with a particular focus on its impact on preservation, accessibility, and the retrospective diagnosis of pathological processes.

Subjects and methods: The research is based on assemblages from two historical mass graves: Mohacs (Hungary, 1526) and the Napoleonic retreat from Russia (1812). Skeletal elements were digitized using high-resolution CT and micro-CT imaging. Virtual models were analysed to assess bone preservation, identify pathological alterations, and reconstruct trauma patterns. Digital datasets also enabled the virtual manipulation of fragile or inaccessible specimens, as well as the production of 3D-printed replicas for further study.

Results: 3D imaging significantly enhances the analysis of fragile and restricted-access materials by enabling detailed observation without physical handling. Virtual reconstructions improve the identification of pathological lesions and trauma patterns that are difficult to detect macroscopically. This approach also facilitates the reconstruction of pathological processes, including infectious and traumatic conditions, through the analysis of internal bone structures. Furthermore, digital archiving ensures the long-term preservation and reproducibility of observations.

Conclusions: 3D imaging constitutes a major methodological advance in bioarchaeology. It not only preserves vulnerable material and improves accessibility but also provides substantial added value for retrospective diagnosis and the reconstruction of pathological processes. These technologies contribute to a more comprehensive understanding of past populations while addressing ethical and conservation constraints.

Keywords: 3D imaging; Mass graves; Paleopathology; Trauma analysis; CT scanning.

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