

## P2. POSTER

# Insights into Prehistoric Amputations: Surgical Procedures with Medical Purposes?

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## AMPUTATION DURING PREHISTORY AND IMPLICATIONS

Evidence shows that limb amputation has a much deeper history than traditionally assumed. For decades, the earliest secure examples were thought to date to the Neolithic<sup>[1]</sup>. However, recent discoveries push the emergence of successful surgical amputation back into the Late Pleistocene (ca. 31,000 years ago). Among others, reliable cases show clean sec-

tioning of bone, structured healing, and absence of infection—indicators of advanced medical knowledge. In addition to later examples from the Holocene, this suggests that prehistoric communities possessed anatomical understanding, effective wound care, and social structures capable of supporting long-term disabled individuals with complex caring behaviour earlier than previously recognized by the History of Medicine.



Prehistoric handprints may also represent finger amputations (Cosquer Cave, France).



Oldest amputation. Extracted from *Maloney et al. (2022)*

## LIMITATIONS

Despite its significance, prehistoric amputations remain difficult to study. First, they are extremely rare, limiting comparative analyses and broader interpretations. Second, bone loss due to taphonomic processes (e.g., soil erosion or animal gnawing) can mimic the absence of a limb, requiring careful contextual assessment to avoid misidentification. Third, extensive healing obscures diagnostic features: as bone

remodels, cut marks may be erased, preventing identification of anthropic intervention. Finally, determining the cause of an amputation remains challenging. Surgical removal, traumatic injury, infection, and punitive mutilation can produce similar skeletal signatures. These limitations suggest that each case must be analysed individually, combining palaeopathological, contextual, and comparative approaches.

## FUTURE DIRECTIONS

Improving our understanding of prehistoric amputations requires advancing methodological and experimental approaches. High-resolution micro-CT allows distinguishing taphonomic damage from remodelling patterns. Comparative reference datasets drawn from historical medical cases will strengthen diagnostic criteria as a necessary referential framework.

Additionally, controlled experiments using replica prehistoric tools on human corpses

can replicate amputation techniques and tool-mark signatures, providing critical baselines for interpreting archaeological modifications on bone surfaces. These approaches may aid in differentiating accidental trauma from intentional surgery.

As these methods expand, future work will move beyond isolated case studies toward a systematic understanding of early medical practices, enabling accurate identification of prehistoric surgical interventions and their implications for the History of Medicine.

### Historical framework

### Key prehistoric cases



Amputations. Extracted from *Museum anatomicum*, E. Sandifort, 1793



Left ulna (Ro73-7291) from Roc de les Orenetes (Spain), a potential amputation. The bone and radiological imaging (X-ray and micro-CT) show bone remodeling and no signs of active infection (image after Moreno-Ibáñez et al., 2024).

### Experiments



Experimental simulations of prehistoric surgical procedures and observed cut marks (down-right).

## REFERENCES

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