

## AN INCOMPLETE FATAL TREPANATION DIAGNOSED ON CREMATION REMAINS (ROME, ITALY, 2<sup>ND</sup> C. AD)

### NEDOVRŠENA SMRTONOSNA TREPANACIJA UTVRĐENA NA KREMIRANIM OSTACIMA (RIM, ITALIJA, II. ST.)

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#### SUMMARY

**Background:** An original case of incomplete (and reasonably fatal) human trepanation is described in this short paper. The diagnosis was made on the cremated remains of a young adult individual who died in Rome, Italy during the 2<sup>nd</sup> century AD. **Clinical Presentation:** The trepanation was incomplete, as death occurred quickly due to vascular lesions, according to the anatomic analysis of the bone piece. Comparable trepanation from Roman times are described and related to this case. **Conclusion:** Even if archaeological, this case highlights the possibility of such a diagnosis on post-fire fragmented bones. Very suggestive lesions of section are of great interest for the history of such a practice during classical Antiquity. Lastly, from a medical and forensic point of view, such a diagnosis may be of interest during any identification process and research for a cause of death during anthropological analyses.

**Keywords:** Cremation; forensic anthropology; hemorrhage; history of medicine; iatrogenic death; roman period; neurosurgery; paleopathology

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## INTRODUCTION

Cranial trepanation is probably one of the oldest surgical intervention performed by humanity with cases dating towards the Mesolithic period [1,2], followed by amputation [3]. This new case, dating from the Roman Imperial period is exceptional for two reasons. First, this case is the first one of a trepanation diagnosed on Roman cremated remains (another cremated case of a completely healed trepanation has been described in Vronda grave 4, burial 1, from Early Iron Age) [4]. Second, it shows that, despite a relative anatomical precision, death may have occurred as a iatrogenic complication.

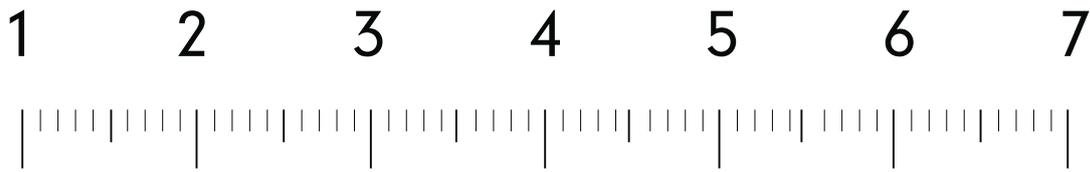
## METHODS

In 1998, the excavations of the necropolis situated under the Via Trionfale (Rome, Italy) carried out by the *Soprintendenza Archeologica di Roma* put to light 18 cremation tombs dated from the Roman Imperial period (1st to 2nd century AD) according to architectural remains and grave offerings. A total of 8 inhumation tombs were associated to this human group, dating from the Etruscan period (4th to 3rd century AD).

According to new standards of osteo-archaeology, a systematic anthropological examination was carried out on all the human bone samples recovered [5].

## RESULTS

During the analysis of the remains of the cremation “Trionfale 6” corresponding to an adult of undeterminable sex (probably a man if we consider the massive aspect of the mandible), an evidence of trauma in form of a trepanation was noted on a fragment of the cranial vault. This oval fragment of cranial vault, measuring 5 x 3.2 centimeters, with a thickness of 0.4 centimeter, presented very smooth and regular external limits [6]. But all the fragment did not show such a peripheral section, as an angle of this piece of bone still presented an irregular spiny aspect, which was broken after death (very likely during the cremation process) [7]. The limits of the piece showed a slight external eversion. The inner table of the bone had not been conserved, due to the fragmentation of the skull with heat and fire [8]. However, we can deduce from vascular and muscular print at the external surface that this fragment of skull vault belonged to the central part of a left or right parietal bone [9].



External view of the vault fragment (measuring 5 x 3.2 centimeters).  
Primitively non-cut segment is on the left upper part.

## DISCUSSION

The anatomical presentation of such a case is clearly related to an incomplete trepanation (i.e. a trepanation where death occurred before the end of the surgical section). We can so hypothesize a large part of the last hours of this individual.

A trepanation was carried out on the skull of an adult. The reason for such a surgical intervention remains unknown, but medical and general authors from Antiquity (Hippocrates, Celsus, Pliny the Elder, Galen, Heliodorus, etc.) [10] and Etruscan osteo-archaeological examples [11] testified of such a practice for various causes: stroke, epilepsy, headache, trauma, paralysis, blindness, religious facts, magical belief, etc. During the intervention, the practitioner, while cutting the external part of the bone with his surgical instrument (a bronze knife, according to contemporary conserved medical objects), caused a vascular trauma (one of the middle meningeal arteries,

according to the anatomical site of the trepanation, and a comparison with the vascular imprints that can be seen on the endocranial side of comparable parietal vault fragment) provoking a massive and lethal intra-cranial hemorrhage [9]. Death occurred quickly so that the practitioner did not have time to finish his intervention, explaining that a segment of the trepanned bone remained attached to the rest of the cranial vault. Macroscopic aspect of the burnt bones clearly indicate evidence of cremation of fresh bone: the body was then cremated in the few hours or days following death [11] according to Roman Imperial practice; when the skull exploded in the pyre because of gas inflation and rapid dehydration, the piece of bone incompletely removed by the practitioner was broken by fire and “liberated” from the other parts of the skull (giving is its actual aspect).

The examination of all the other parts of the skeleton was not informative about the reason of performing such a dangerous intervention. Severe enthesopathies on both iliac crests and both calcaneus were identified, testifying of an important physical activity. A slight osteo-arthritis existed on the anterior marginal part of all conserved vertebral bodies, related to the adult age of the individual. Three hernia of Schmorl were present on the superior part of three adjacent thoracic body vertebrae [8]. No other pathology/lesions was found on the rest of the skeleton.

Due to the exact presentation of the bone modifications, all differential diagnoses can be excluded: warfare or interpersonal violence trauma (fracture), post-mortem modification such as a cut mark, etc.

We are well documented on cranial surgery at Roman time thanks to contemporary medical books but osteo-archaeological case reports from this period seem to be very few [12-16] and have all been described on complete skeletons. Three corresponded to adults and one to a child of 5 to 6 year-old whose trepanation was associated to hydrocephaly caused by an intracranial expanding lesion. One of the adults had a primitive dental infectious lesion (abscess) complicated by meningo-encephalitis and secondary vertebral abscesses [16].

## CONCLUSIONS

This archaeological case from Via Trionfale (Roma) is particularly interesting because it shows the possibility of a diagnosis of trepanation on cremated remains. It is also of great importance in the field of history of neurosurgery, describing an “in progress” trepanation at the moment of death. By extension during medical and/or forensic anthropology analyses, the identification of such a lesion (and its anatomical position) may be of great interest during an identification process (cranial surgical particularity), or for the determination of causes or manner of death.

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#### SAŽETAK

**Uvod:** Ovaj kratki rad opisuje izvorni slučaj nedovršene, fatalne trepanacije. Dijagnoza trepanacije postavljena je temeljem pregleda kremiranih ostataka mlade odrasle osobe umrle u II. stoljeću u Rimu. **Klinička slika:** Anatomskom analizom kostiju utvrđena je nedovršena trepanacija, vjerojatno zbog smrti koja je nastupila netom nakon početka zahvata kao posljedica oštećenja krvožilja. Uz to, prikazani nalaz uspoređuje se sa sličnim slučajevima trepanacije iz rimskog razdoblja. **Zaključak:** Iako temeljen na arheološkim ostacima, ovaj slučaj ističe mogućnost dijagnosticiranja trepanacije iz kremiranih i fragmetniranih koštanih ostataka. Sugestivna oštećenja utvrđena na koštanom materijalu od značajnog su interesa za povijest trepanacije u klasičnoj antici. Također, ovakav slučaj može biti od interesa medicinskoj struci tijekom identifikacijskih procesa i antropološkog utvrđivanja uzroka smrti iz koštanih ulomaka.

**Ključne riječi:** kremacija; forenzička antropologija; povijest medicine; jatrogena smrt; rimsko razdoblje; neurokirurgija; paleopatologija