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An unusual case of prone position in the Punic/Roman Necropolis of Monte Luna in Sardinia (Italy): a multi-disciplinary interpretation of Tomb 27

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Corresponding Author:	Rossella Paba, M.D. University of Cagliari: Universita degli Studi Di Cagliari cagliari, CA ITALY
First Author:	Rossella Paba
Order of Authors:	Rossella Paba Dario D'Orlando Anna Willis Carlo Luglie' Kate Domett
Abstract:	<p>Sardinia (Italy), noted for its wealth and strategic position, has been conquered through time by different populations and each one of them instilled their specific culture, ritual behaviour, and customs. Sometimes a clearcut distinction is evident between these cultures, while other times it is more of a natural progression with no marked moment of change evident. This study discusses a single grave from the Necropolis of Monte Luna, established by the Punics, with depositional chambers and pits carved on a rockhill in front of the city settlement (Acropolis). Among the 120 tombs, the finding of Tomb 27, a tomb that included a young woman (T27.2) buried in an atypical prone deposition, having disturbed an earlier burial (T27.1), a subadult around 15 years of age. T27.2 suffered two distinctive types of perimortem trauma, a possible diastatic blunt force trauma to the occipital bone and a small quadrangular-shaped lesion reminiscent of a Roman era square shaped nail. The grave goods allow a quite specific dating to the period of transition between Punic and Roman cultures. These, and other characteristics of the young woman's skeleton, are of significance in understanding funerary and cultural behaviour at the time of this transition.</p>
Suggested Reviewers:	Hallie Buckley Hallie.buckley@otago.ac.nz David Errickson David.Errickson@cranfield.ac.uk Mauro Puddu mauro.puddu@unive.it Giampaolo Piga giapiga@uniss.it Valentino Nizzo valentino.nizzo2@unibo.it
Opposed Reviewers:	

5th August 2022

To the attention of the editorial board of the Journal of Archaeological Science: Reports,

I am submitting this manuscript for consideration for publication in an upcoming issue.

The manuscript is entitled “*An unusual case of prone position in the Punic/Roman Necropolis of Monte Luna in Sardinia (Italy): a multi-disciplinary interpretation of Tomb 27*”.

The Monteluna Necropolis in Sardinia shows the transition between the Punic and Romans while they were contesting the control over the Mediterranean basin. Among 120 tombs, one stood out for its unusual characteristics - it contained two individuals with a single set of funerary goods, and one of those individuals was buried in a prone position with evidence of multiple trauma. The individual buried face down was a young woman around 20 years old, with traumatic injuries to her right clavicle and two on the cranium, occurring, respectively, antemortem and perimortem. One of the cranial traumatic lesions, in the frontal bone, has evidence of a penetrating sharp force injury from an object of quadrangular section which resembles the Punic-Roman ritual nails.

The accurate application of anthropological analyses alongside detailed archaeological data and literature sources suggest an osteobiography of significance in understanding funerary and cultural behaviour at the time of Punic-Roman transition.

I declare that this study has not been published elsewhere and that it has not been submitted simultaneously for publication elsewhere. Furthermore, my co-authors and I have no competing interests to state.

Thank you very much for your consideration.

Yours Sincerely,

Rossella Paba

Rossella Paba
College of Medicine and Dentistry
James Cook University
Douglas
QLD 4814
Australia
ross.paba@gmail.com

An unusual case of prone position in the Punic/Roman Necropolis of Monte Luna in Sardinia (Italy): a multi-disciplinary interpretation of Tomb 27

Paba, Rossella^{1,3,4}–; D’Orlando, Dario², Willis, Anna³, Luglie’, Carlo¹, Domett, Kate⁴

Highlights:

- *Understanding past people’s lives based on biological evidence, funerary behaviour, cultural material, and ancient literature*
- *Multiple traumatic lesions associated with prone deposition: an individual osteobiography*
- *An unusual Punic/Roman deposition: a population perspective*
- *Snapshot of the Punic and Roman passage of power over the Mediterranean Sea*

Running head: UNUSUAL CASE OF PRONE POSITION IN PUNIC/ROMAN ERA

1 *An unusual case of prone position in the Punic/Roman Necropolis of Monte Luna in*
2 *Sardinia (Italy): a multi-disciplinary interpretation of Tomb 27*

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4 Paba, Rossella^{1,3,4}✉; D'Orlando, Dario², Willis, Anna³, Luglie', Carlo¹, Domett, Kate⁴

5

6 ¹ *LASP – Laboratorio di Antichità Sarde e Paletnologia, Dipartimento di Lettere, Lingue e*
7 *Beni Culturali – Università degli studi di Cagliari, P.zza Arsenale 1, 09124 Cagliari, Italy*

8 ² *Università degli Studi di Cagliari, P.zza Arsenale 1, 09124 Cagliari, Italy*

9 ³ *College of Arts, Society, and Education, James Cook University, Townsville, Queensland,*
10 *Australia*

11 ⁴ *College of Medicine and Dentistry, James Cook University, Townsville, Queensland,*
12 *Australia*

13

14 **✉Corresponding Author:**

15 Paba, Rossella

16 ross.paba@gmail.com

17 rossella.paba@unica.it

18 rossella.paba@my.jcu.edu.au

19

20 Phone: +39 3270442743

21 +61 439427284

22

23

24

25 *Keywords:* Bioarchaeology, Taphonomy, Prone position, Punic era, Roman era, Archaeology,
26 Pottery, Coins, Sardinia, Western Mediterranean

27 **Abstract**

28 *Sardinia (Italy), noted for its wealth and strategic position, has been conquered through time*
29 *by different populations and each one of them instilled their specific culture, ritual*
30 *behaviour, and customs. Sometimes a clearcut distinction is evident between these cultures,*
31 *while other times it is more of a natural progression with no marked moment of change*
32 *evident. This study discusses a single grave from the Necropolis of Monte Luna, established*
33 *by the Punics, with depositional chambers and pits carved on a rockhill in front of the city*
34 *settlement (Acropolis). Among the 120 tombs, the finding of Tomb 27, a tomb that included a*
35 *young woman (T27.2) buried in an atypical prone deposition, having disturbed an earlier*
36 *burial (T27.1), a subadult around 15 years of age. T27.2 suffered two distinctive types of*
37 *perimortem trauma, a possible diastatic blunt force trauma to the occipital bone and a small*
38 *quadrangular-shaped lesion reminiscent of a Roman era square shaped nail. The grave*
39 *goods allow a quite specific dating to the period of transition between Punic and Roman*
40 *cultures. These, and other characteristics of the young woman's skeleton, are of significance*
41 *in understanding funerary and cultural behaviour at the time of this transition.*

42

43 1. Introduction

44 In the last few decades, the highly detailed analysis of human skeletal remains, and the
45 people they represented, has seen a significant surge of interest (Buikstra and Beck, 2006).
46 The creation of individual osteobiographies of past people has provided a nuanced
47 understanding of individual lives, as well as adding data to the population perspective
48 potentially allowing larger social phenomena to be examined (Binford, 1971; Domett et al,
49 2016). Key to the understanding of past people's lives based on their biological evidence, is
50 the consideration of the context in which they lived, their social and physical environment,
51 and died - a truly bioarchaeological approach (Gowland and Knusel, 2006).

52 A re-examination of an old photograph of Tomb 27 (Figure 1), excavated from the
53 Punic/Roman Necropolis of Monte Luna (Senorbì) in Sardinia, stimulated the present study.
54 The photograph shows human skeletal remains in a prone deposition and surrounded by
55 grave goods. An individual buried in a prone position is often considered deviant (Murphy, E.
56 M., 2008, pp 12 - 17) if it is different than the norm for the period and/or populations on
57 which the examination is focused. It has been widely observed that, regardless of culture,
58 period and geographical area, humans tend to bury some individuals in their society in
59 particular ways, differentiating them in death from others. These usually reflect specific
60 circumstances such as an individual guilty of criminal behaviour, women who died during
61 childhood, and people affected by dangerous and inexplicable diseases or disabilities (Tsaliki
62 A., 2008). While each case reflects specific social and religious beliefs, they can generally be
63 interpreted as an apotropaic way to prevent the person's return from the world of the dead,
64 ensuring their permanent exile from the living community. There are testimonies from the
65 Roman age to Medieval times, both in Italy and in Sardinia (Piga et al., 2015; Quercia, A.,
66 Cazzulo, M., 2016), that provide a basis for understanding the case presented here, however,
67 there are some aspects that differ from the common profile of such deviant burials. The aim is
68 to examine all the available archival evidence, the current literature, alongside a detailed
69 archaeological analysis of the region, the time period and grave goods, and the biological data
70 from the skeletal remains themselves. All aspects may have relevance to the interpretation of
71 the symbolic behaviour useful to reconstruct a story of a single individual to understand the
72 ideology of the community that buried them.

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74 *Figure 1 Tomb 27 (Costa, A. M. 1980, tab. XCIII). First layer of excavation exhibiting a prone deposition (red oval); in the*
75 *right corner, representing a lower layer, is the cranium (yellow oval).*

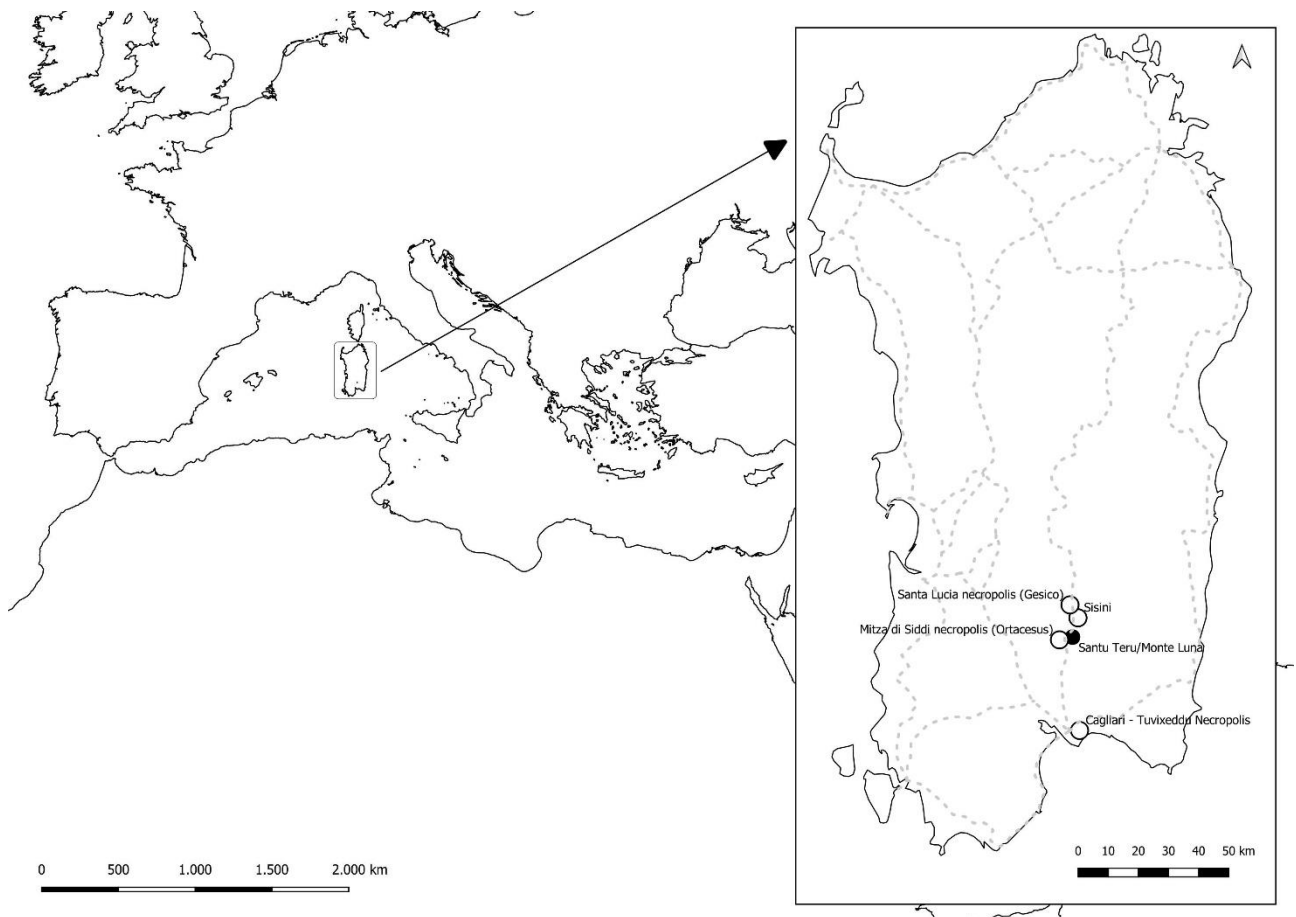
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77 **2. Archaeological context**

78 *2.1 Geographic and historical background*

79 The site of Monte Luna is in the central-southern part of Sardinia, near the city of Senorbì,
80 which is 30 km north from Cagliari (Figure 2). The necropolis is thought to be linked to the
81 urban settlement of Santu Teru, a Punic-Roman city active from the 6th century BC until
82 mediaeval times, probably as a direct emanation of Cagliari (KRLY in Punic language and
83 Caralis/Carales or Karalis/Karales during the Roman phase). During the Punic phase KRLY
84 was possibly in charge of the entire area where the city of Santu Teru is located. In fact, this
85 settlement is linked to an agricultural economy managed by the city of KRLY under the
86 direction of the main Punic centre of the Western Mediterranean, Carthage. The city of Santu
87 Teru was possibly one of the main urban settlements linked to the management of cereal
88 production, probably wheat, for the Punic city of KRLY and it demonstrated a high level of
89 wealth, as suggested by the majestic funerary artefacts found in the Monte Luna necropolis
90 active from the end of the 6th century BC to the Roman Republican age (Todde, 2020). More
91 is known about the settlement of Santu Teru during the Republican and Imperial ages,
92 attested by an inscription (Forci, 2011) which states that the city was active during the first
93 Imperial age. Information regarding the Imperial age phases is disjointed and incomplete.
94 However, the city seems to have survived beyond the end of the Roman Empire dated to the
95 6th century AD as is evidenced by some Late Antique and mediaeval pottery (7th - 8th c. AD)
96 found near the site of the so-called *acropolis*. The *acropolis* was a place where some scholars
97 had hypothesised the existence of the mediaeval village attested by the agiotoponym of *Santu*
98 *Teru*, which is linked to a church related to the worship of Saint Theodorus that gives name to
99 the whole area (Costa, Usai 1990).

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105 2.2 The necropolis of Monte Luna

106 The necropolis of Monte Luna (Figure 3) was investigated archaeologically during the late
107 1970s to the early 1980s by Antonio Maria Costa as *Ispettore onorario* (Honorary Inspector)
108 for the local *Soprintendenza ai Beni Culturali* (Superintendent for Cultural Heritage). Only a
109 portion of the necropolis was excavated but at least 120 tombs were partially documented,
110 though there is a significant lack of contextual information recorded (Costa, 1980; 1983a;
111 1983b; 1983c; Costa, Usai 1990).

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112

113 *Figure 3 Aerial photography of Monte Luna at present. Red arrow indicates Tomb 27 (Aerial photo and planimetry: R.*
114 *Paba)*

115 During the investigation, Costa describes two different funerary areas. The first, Monte Luna,
116 active from the 6th - 2nd century BC, located immediately in front of the hill of Santu Teru,

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117 with its wealthy tombs and the second, the *necropoli romana* (Costa, Usai, 1990), a few
118 metres north-west from Monte Luna, which was active from the 2nd - 1st century BC until the
119 4th - 6th century AD. The original funerary area of Monte Luna is composed of chamber
120 tombs with an access pit similar to the ones used in the necropolis of Tuvixeddu in Cagliari,
121 pit-tombs, like Tomb 27, along with other types such as cist tombs and *enchytrismo*i (jar
122 burials) (Costa, 1983c). Some of the tombs, such as Tomb 87, also known as the *tomba*
123 *principesca*, suggests a number of the inhabitants of Santu Teru were wealthy as they were
124 buried with funerary goods including masterpieces of Magna Graecia jewellery (Usai, 1981;
125 Pisano, 1996). As to the rituals, there is evidence for both inhumation and cremation, but the
126 former is the more common rite (Costa, 1983c). The *necropoli romana* instead is little known
127 and only 10 tombs were excavated. This funerary area is composed of simple rectangular
128 graves and cist tombs and were probably in use after the necropolis of Monte Luna.

129 2.2 The archaeological framework of the Tomb 27

130 Tomb 27 is a pit-tomb (Figure 3) carved into the stone of the hill of Monte Luna. The
131 funerary artefacts found in this tomb include a pitcher, a *balsamarium* (ointment jar) of Punic
132 production, and a jug and cup of Punic Black gloss-ware, providing evidence of the
133 chronology of the deposition. Two coins and some glass beads that were part of a necklace
134 were also found (Figure 4).



135

136

Figure 4 Tomb 27 grave goods. (D. D'Orlando)

137

138 The pitcher may be an example of the last evolution of the Cintas 61 type vase, which dates
 139 to the 3rd-2nd century BC. One has clear similarities with some of the vessels from the
 140 necropolis of Tuvixeddu (Bartoloni, 2000, pp. 91) and could be considered to suggest a direct
 141 commercial, and perhaps cultural, connection between Cagliari and Santu Teru. The coins,
 142 one Sardo-Punic and one Roman emission overstruck on an earlier Sardo-Punic coin, are of
 143 particular interest (Hersch, 1953). The latter helps to date the context to between the last
 144 decade of the 3rd century BC and the beginning of the 2nd. Even more precise, from a
 145 chronological point of view, is the Punic Black gloss pottery cup, identified as a Lamboglia
 146 28F/Morel 2648 form, dated from the end of the 3rd until the 2nd century BC (Morel, 1981,
 147 pp. 200-201). The funerary artefacts of Tomb 27 all confirm that the burial context dates
 148 from at least the last decades of the 3rd century BC but, given the presence of the other
 149 artefacts, a more precise chronology into the early 2nd century BC, perhaps from the very first
 150 decades, is suggested.

151

152 3. Anthropological setting

153 The necropolis of Monte Luna contained 120 tombs with human remains recovered from 70
154 tombs. All the tombs were re-used, with two or more people in each, up to a maximum of 12
155 adults within one tomb. Interestingly, when subadults and young children are present in the
156 tomb, it was not re-used for more than one additional individual. Tomb 27 is located near two
157 analogous depositions, Tomb 25 and 28, that both, like Tomb 27, contain two individuals,
158 one adult female and one subadult, and in the case of Tomb 28 with the same genetic traits
159 and presence of grave goods. It is possible that within the necropolis, burials were localised
160 based on familiar lineage. There are multiple tombs with the same deposition of the bodies: in
161 the same stratigraphic unit, along the same line, and archived in the brief excavation
162 information as an adult male, an adult female, and one or more subadults, side by side.
163 Whether the people in this tomb are family, will hopefully be confirmed through DNA
164 analysis in further studies.

165 Due to poor preservation and comingling of the human remains within tombs, the recording
166 of each tomb is undertaken in a systematic manner as follows: each element is sorted by
167 anatomical region and side, and, where possible, upper limb bones (humerus, radius and ulna)
168 are matched to an individual, as are lower limb bones (ilium, femur, tibia, fibula); for each
169 bone, morphology is described and measurements are take; then, following standard methods,
170 age-at-death and sex are estimated, and pathology and trauma are described (Buikstra and
171 Ubelaker, 1994; White and Folkens, 2005; Schaefer, Black and Scheuer, 2009).

172 The minimum number of individuals (MNI), based on the same repeated element within
173 tombs, in the 70 tombs studied has been calculated at 226 adults over 15 years (Brothwell,
174 1981; Lovejoy, 1985) and 59 subadults between 1-15 years (Schaefer, Black and Scheuer,
175 2009). No subadults less than 1 year have been found, which suggests the possible presence
176 of a Tophet, a designated funerary area for unborn and newborn perinates, that was common
177 in Phoenician and Punic times (Xella, 2013).

178 3.1 Human remains from the Tomb 27

179 Given that the excavation diary was missing, the analysis of the 1977 excavation photograph
180 (Figure 1) was essential in understanding the deposition of Tomb 27. In fact, from the image,
181 it is possible to observe a deep grave (2.10 x 0.8 m) showing two distinct excavation levels. It
182 shows the prone deposition of one articulated skeleton which occupies the entire space of the
183 tomb located in the upper layer, and the location of another deeper deposition, a non-

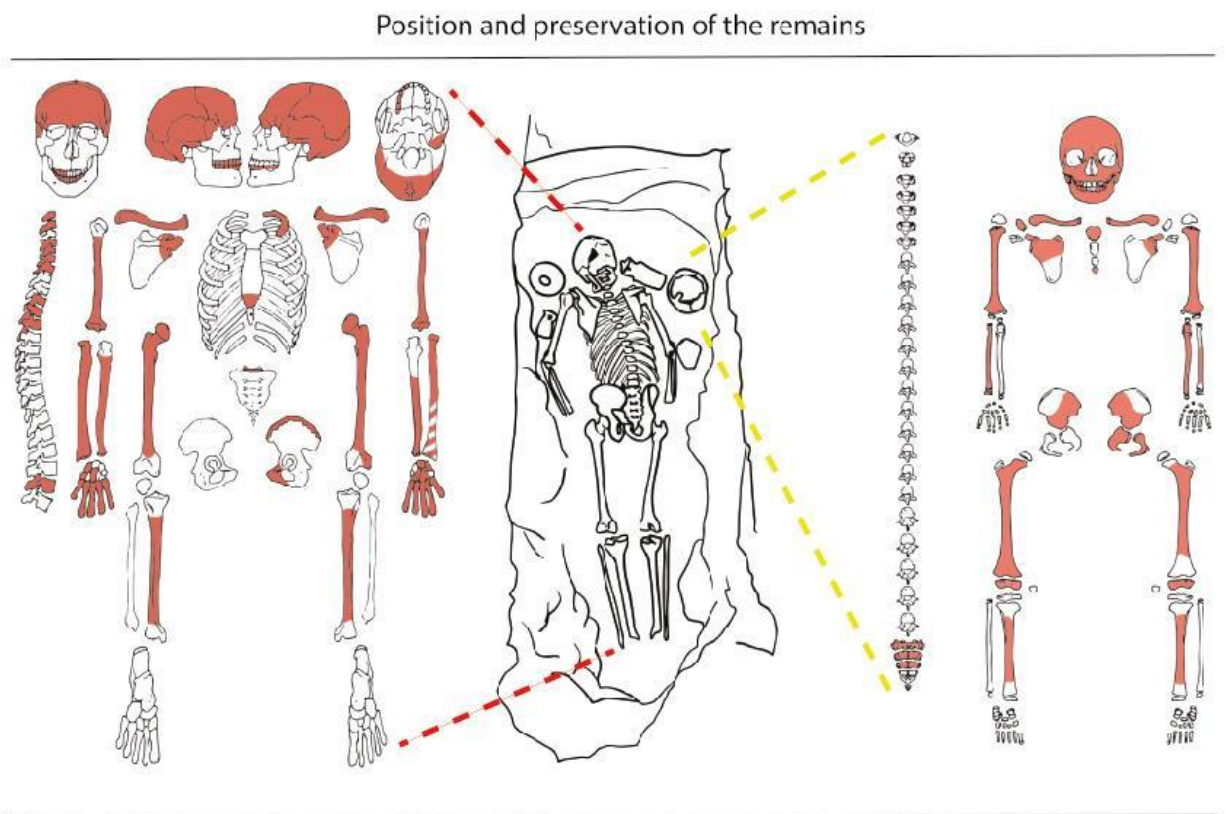
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184 articulated skeleton in the upper right corner. Based on the articulated nature of the prone
185 skeleton (ML_T27.2), it is evident that this individual was the secondary deposition, while
186 the primary, now disarticulated, deposition (ML_T27.1), is the one in the upper right corner
187 of the pit, evidenced in Figure 1 only by the crania; the postcranial remains were located
188 under it. In support of these observations, iron oxide was found on both individuals: on the
189 anterior proximal part of the humeral metaphases of ML_T27.2, and on the posterior aspect
190 of the skull and the posterior aspect of the left humeral metaphysis of ML_T27.1, supporting
191 the prone and supine position, respectively (Figure 5). Seventy-five per cent of the skeletal
192 remains were recovered for both individuals.

193

194

195



196

197 *Figure 5 Graphic representation of position and conservation of the human remains from Tomb 27. The yellow lines indicate*
198 *the cranium around which was found the postcranial remains of T27.1. The preserved remains are indicated in the skeleton*
199 *schema to the right. The red lines indicate the location of T27.2, found in the prone position, and represented by the*
200 *preserved remains shaded in the skeletal diagram to the left. (Paba, R.).*

201

202 The primary deposition (ML_T27.1) was estimated to be aged 15 years +/- 3 years based on
203 tooth eruption and epiphyseal fusion. All second permanent molars were erupted, while the
204 crowns of the third permanent molars were only half formed and unerupted. In addition, non-
205 fusion is recorded at the proximal and distal epiphyses of both humeri, the right radius and
206 the left ulna; the acromion process is partially fused, and the coracoid is unfused in the right
207 scapula; the three bones of the pelvis are unfused; the unfused distal epiphysis of the right
208 femur is also present (Schaefer, Black and Scheuer, 2009). Sex was estimated through pelvic
209 and cranial morphology (Schaefer, Black and Scheuer, 2009), but given the very young age,
210 skeletal sexual dimorphism may not yet be fully developed, and this estimation awaits further
211 study, such as through enamel peptide analysis (Stewart et al. 2017).

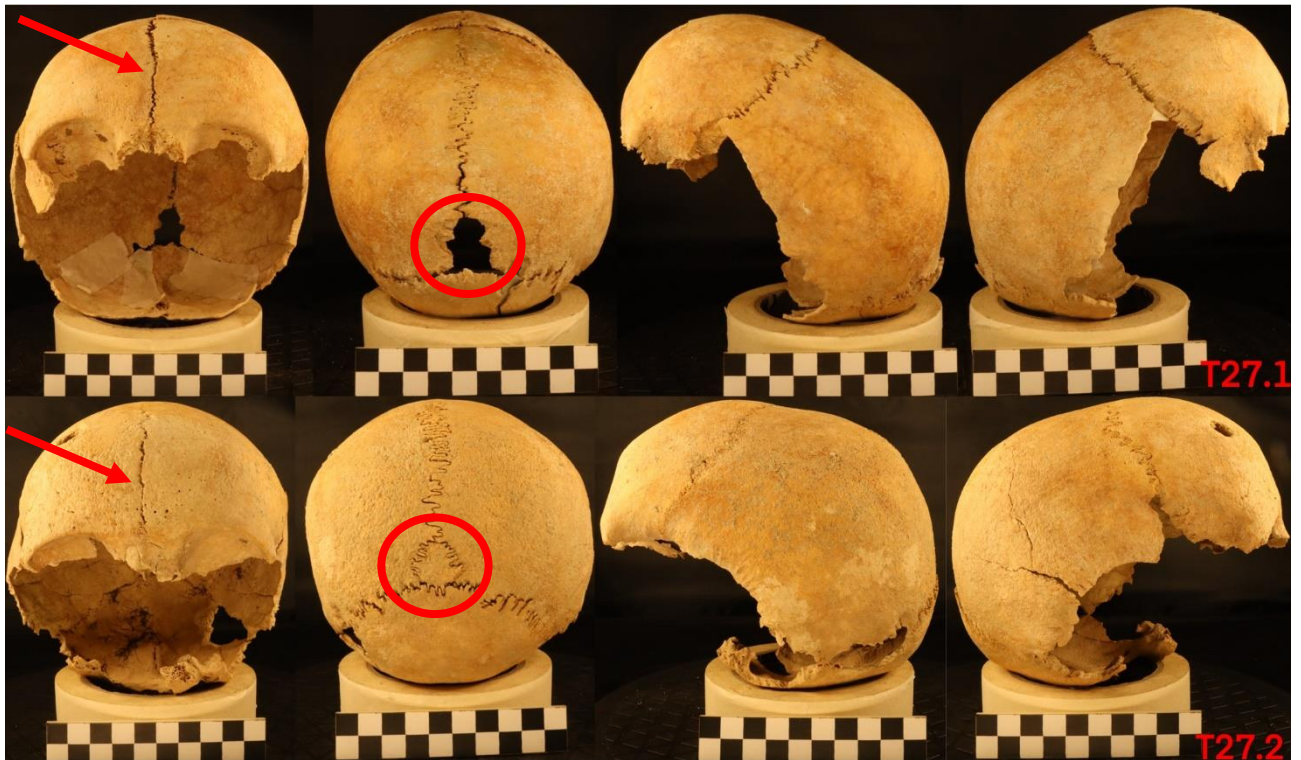
212 The prone secondary deposition (ML_T27.2) was estimated to be a young adult female,
213 based on pelvic and cranial morphology (Buikstra and Ubelaker, 1994), aged between 18-22
214 years (Schaefer, Black and Scheuer, 2009). Age at death was estimated using a multifactorial
215 approach including dental eruption, dental wear, and epiphyseal fusion. The femoral head
216 femur and iliac crest were partially fused. Stature and weight were estimated respectively as
217 153.0 cm and 49.2 kg (median on a CI of 95% (Manouvrier, 1893; Pearson, 1899; Ruff,
218 2012). The stature and weight calculations used here are based on generic European
219 populations, as there are no formulae based on Italians, nor Sardinians. The mean stature of
220 the people buried in the Necropolis of Monte Luna, based on measurements of 32 adult long
221 bones is 157.27 cm for women and 160.62 cm for men.

222 *3.2 Genetics factors*

223 The cranial vaults of T27.1 and T27.2 both have a retained metopic suture and Wormian
224 bones at the intersection of the lambdoidal and sagittal sutures (Figure 6). These traits are not
225 common in the necropolis. In other calvaria with ossicles they are located in other places,
226 such along the sagittal suture, and not associated with metopism. These 'primary' discrete
227 traits (Buikstra and Ubelaker, 1994) in both individuals and in the aforementioned Tombs 25
228 and 28, suggest that there are family areas within the necropolis.

229

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230

231 *Figure 6 Evidence of metopism (Red arrows) and Wormian bones (Red circles) in T27.1 and T27.2 calvarium (Paba, R.).*

232

233 The metopic suture usually closes by 2 years of age, though it can close later in childhood
234 (Coppa, A., and Rubini, M., 1996) or adulthood (Zdilla et al. 2018). While some individuals
235 with metopic sutures have been reported to have larger transverse, cranial dimensions
236 suggesting this feature may be related to morphogenesis (Bolk, 1917; Schultz, 1929), this is
237 not the case in T27 and T28 crania. Further support to a more genetic aetiology is the
238 persistence of the metopic suture into adulthood, which can be hereditary and is more
239 common in some ethnic groups than others (Berry & Berry, 1967). There are some external
240 factors, such as frontal sinus abnormalities, or pathological conditions, such as hydrocephaly,
241 that may also cause it to persist (Zdilla et al. 2018) but the above conditions are excluded in
242 T27. In this case, according to the studies of Torgensen (1951) and Sjøvold (1984), metopism
243 is considered to be a hereditary trait.

244 Lambdoidal Wormian bones are the result of extra ossification centres, but their aetiology is
245 not fully understood (Bellary et al., 2013). In some cases, they are a normal anatomical
246 variation, associated with mechanical stress and the environment (Sanchez – Lara, 2007). For
247 example, in some populations sleeping in a supine position places pressure on the occipital
248 area that can lead to expansion of the occipital suture and brachycephaly (Sanchez – Lara,
249 2007). This can be excluded in the case of T27.1 and T27.2 because their skulls are not

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250 brachycephalic. In other cases, Wormian bones may be related to specific pathology, such as
251 hydrocephaly or craniosynostosis, but these conditions are usually associated with numerous,
252 more than 10, and large, Wormian bones and arranged in a mosaic pattern and size larger
253 than 6 mm by 4 mm (Bellary et al. 2013). Other factors suggested to be correlated with the
254 development of Wormian bones include epigenetic factors, cranial deformation,
255 craniosynostosis, and premature suture closure, none of which are observed here. Other
256 conditions, such as additive polygenic complex or osteogenesis imperfecta may have
257 Wormian bones associated with them (Coppa and Rubini, 1996; Goto et al. 2004; Semler et
258 al. 2010; Bellary et al., 2013). Wu (2011) reported that geographic and ethnographic patterns
259 in frequency suggest a possible genetic basis, with a low frequency in Europe populations.

260 The presence of both these variations in both these individuals and the absence of mechanical
261 stress and cranial deformation, may suggest T27.1 and T27.2 were related to each other, but
262 further evidence, such as DNA, would be required to be certain.

263 Interestingly, in the necropolis the same condition is present in Tomb 28, although the female
264 adult (18-22 years old) has only a thin line of metopism, while the subadult (9+/-3 years old)
265 has a complete opening through the frontal bone up to the coronal suture similar to both
266 individuals in Tomb 27. The Tomb 28 individuals also have Wormian bones located in the
267 lambdoidal suture, with the same shape and number of ossicles (2).

268 *3.3 Trauma*

269 Individual T27.2, the young adult female, presents with multiple traumatic lesions (Figures 7,
270 8, 9), suggesting the presence of both antemortem and perimortem trauma.

271 There is a healed fracture in the midshaft of the right clavicle (Figure 7). Healing has resulted
272 in a thickened middle half of the clavicle. These types of fractures often occur in childhood
273 and typically result from axial, longitudinal compressive forces (Nunn et al. 1989) commonly
274 associated with a fall onto the shoulder or the outstretched hand, or from a direct blow to the
275 humerus, either of which could be accidental or the result of intentional violence (Blount
276 1955; Thornton and Gyll 1999).



277

278 *Figure 7 Evidence of healed trauma in the midshaft of the right clavicle of T27.2. Superior view (A) with focus on the healed*
279 *trauma in red rectangle, and posterior view (B), red arrow points at the trauma. (Lai, G.).*

280

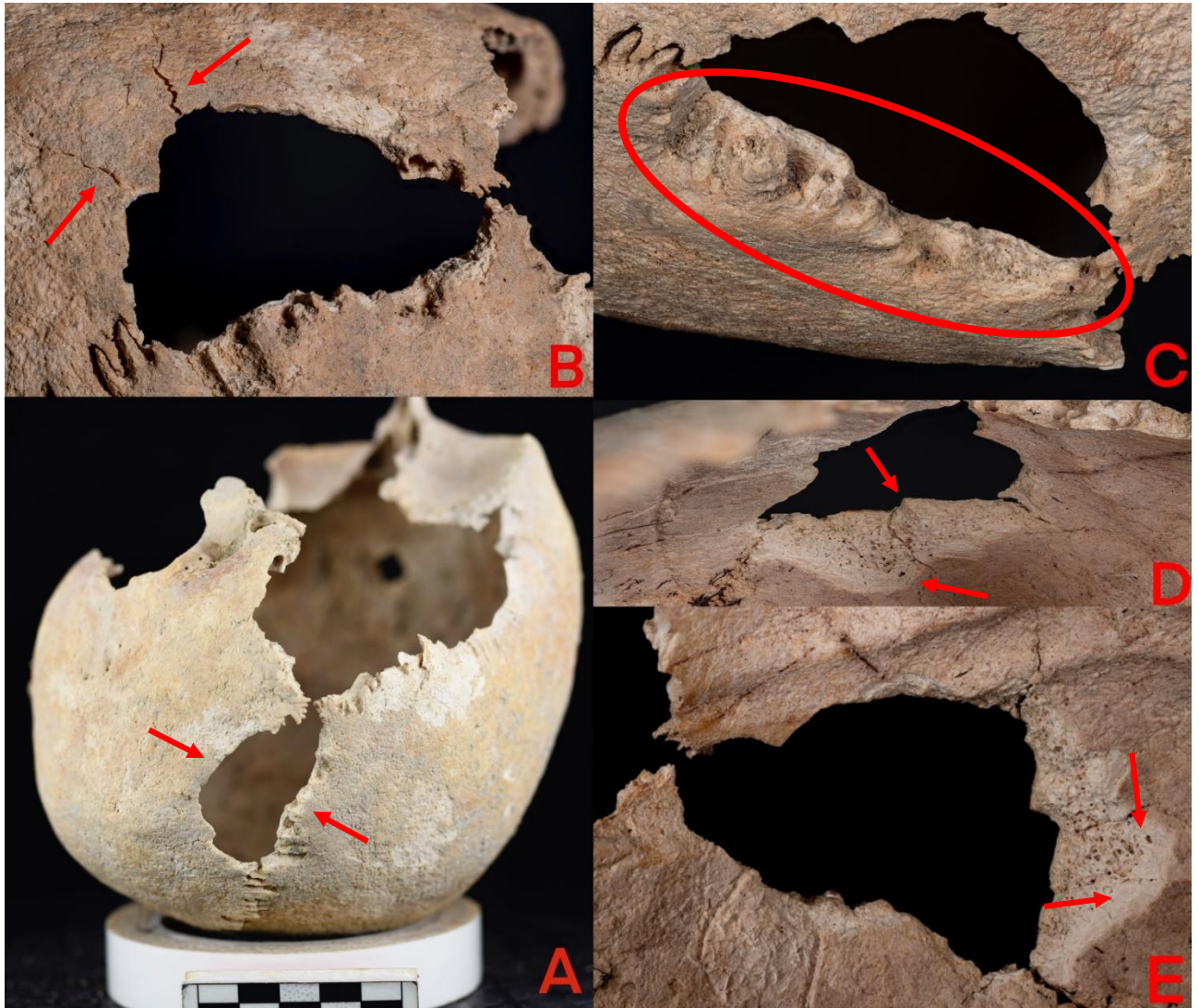
281 Two traumatic injuries are evident on the cranium, possibly occurring peri or postmortem.

282 One triangular-shaped lesion, measuring 41 x 19 mm, is located on the inferior aspect of the
283 left occipital bone, just posterior to the lambdoidal suture (Figure 8) inferior to the hat brim
284 line which is not consistent with an intentional blow (Kremer, 2009). Endocranially, there is
285 an 'exfoliation' of a bone flake (Figure 8D/E) which is commonly seen with blunt force
286 trauma as the force moves from the external aspect, inwards (Wedel and Galloway, 2004).

287 There is also evidence of two short radiating fracture lines out from the medial aspect of the

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288 lesion usually associated with a moderate- or high-velocity impact on a common point
289 (Kieser et al., 2014) (Figure 8B).



290
291 *Figure 8 Evidence of occipital trauma on left lambdoid suture (A) (Paba, R.). B, C, D and E show a focus on the trauma. B*
292 *and C focuses on ectocranial surface, red arrows point to the radiating fractures (B) and red oval to osteoclastic reaction*
293 *along the lambdoid suture where has been hypothesized a disarticulation due to a diastatic fracture along the suture based*
294 *on the supposed point of impact and the evidence in B. D and E shows endocranial perspective in which is possible to*
295 *distinct weathering effect from remodelling thanks to the osteoclastic activity. Particular of the trauma from ectocranial*
296 *point of view and red arrows to indicate radiating fractures (B-C). Endocranial visual of the trauma with weathering effect*
297 *(red arrows in D-E). (Lai, G.)*

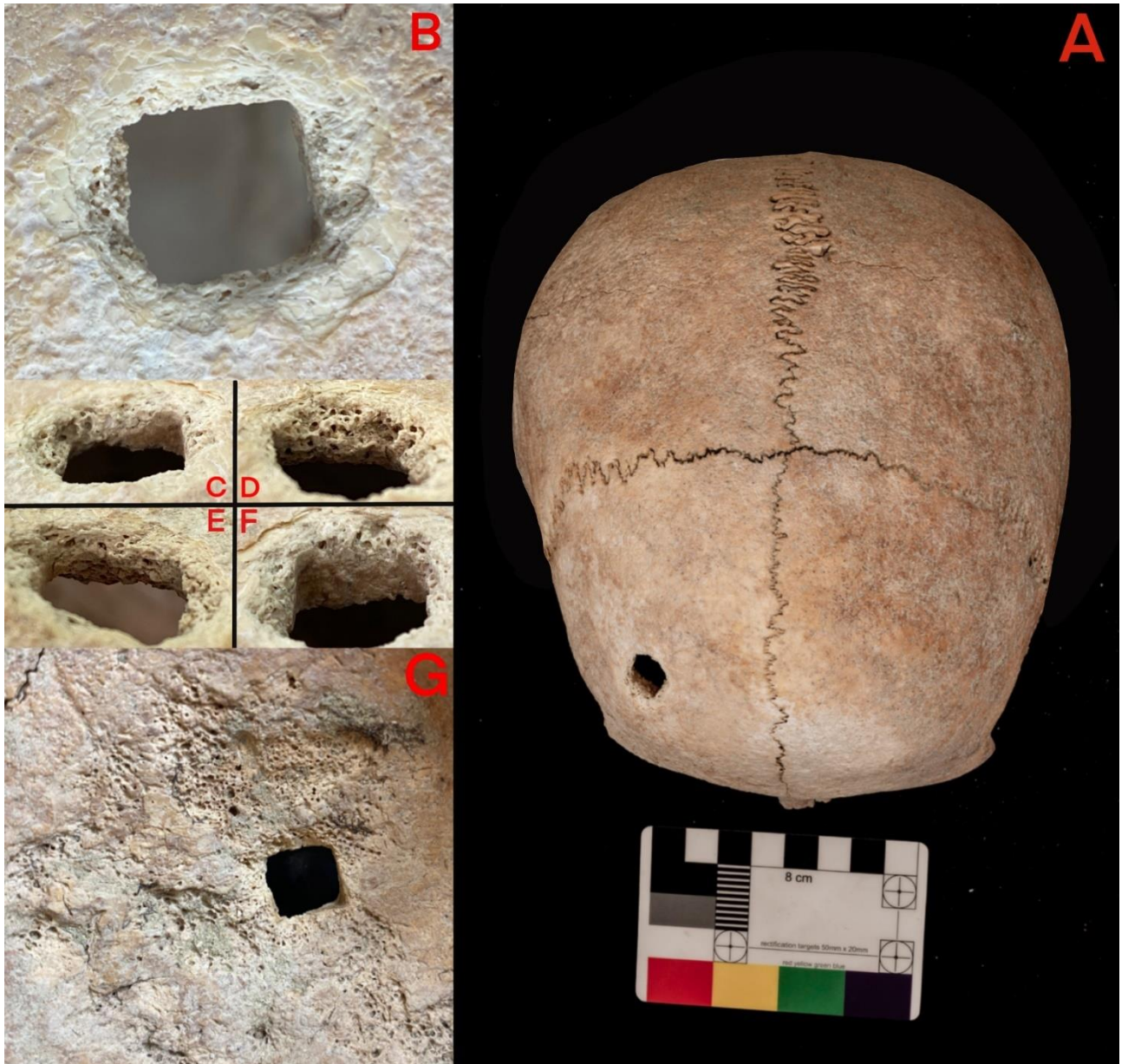
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299 This traumatic lesion is possibly a short radiation fracture along the suture, leading to a
300 possible diastatic lesion which caused the left lambdoid suture, at the point of trauma, to
301 disarticulate (White et al, 2012, p.434). This suggestion is supported by the observation that
302 most of the other sutures (coronal, sagittal, and right lambdoid) are slightly more fused than

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303 the left lambdoid (Buikstra and Ubelaker, 1994). In Figure 8C, it is possible to see where the
304 disarticulation has occurred as there is a change in the surface of the suture to a rounded and
305 pitted area possibly as a result of osteoclastic reaction within the first week of the trauma
306 (Barbian et al. 2008). There is taphonomic change along the margins of the trauma where
307 weathering and adhering soil has changed the colour and appearance, and the bone flake is
308 missing postmortem (Figure 8D/E). Considering the location of the lesion, the radiating
309 fractures, and the opening along the lambdoid suture, this is likely blunt force trauma either
310 from an object or a fall onto this area of the head.

311 The second cranial lesion was located on the right side of the frontal bone showing a
312 penetration from the outside inward (Figure 9). The shape (9.5 mm x 9.5 mm) of the lesion
313 suggests a sharp force injury was inflicted using an object with a quadrangular section
314 (Figure 9). Intentional trephination is unlikely as there are no associated cut marks extending
315 out from the lesion that would be consistent with the usual trephination practice in the Roman
316 Era (Tullo, 2010; Giuffra and Fornaciari, 2017). There is a depression and exfoliation around
317 the area of impact in the outer table due to the force of impact, and there is also bevelling of
318 the inner table edges of the lesion (Figure 9) (Barbian et al., 2008; Facchini et al. 2008;
319 Amadasi et al. 2016); both are characteristic of penetrating injuries with a highly localised
320 point of impact associated with considerable power (Wedel and Galloway, 2004). There is no
321 evidence of bone remodelling (Figure 9), suggesting this incident occurred perimortem
322 (Barbian et al., 2008). The shape of the lesion is similar to the cross section of ancient Roman
323 nails. These nails are a common object in Roman settlements excavations in Sardinia (Figure
324 10).



325
 326 *Figure 9 T27.2 skull. Evidence of frontal trauma and obliteration of the sutures are shown (A) (superior view) (Lai, G.). (B-*
 327 *G) Close up of the right frontal bone trauma. (B) ectocranial view of the trauma showing bone flaking. (C - F) close up of*
 328 *the internal edges of the trauma. (C) is the posterior side, (D) is the right side, (E) is the inferior and (F) the left. These*
 329 *edges show exposed diploë due to the trauma. (G) Endocranial view indicating bevelling of the inner table. (Paba, R.).*

330

331 **4. Discussion**

332 The skeletal remains of T27.2, a young woman buried in a tomb at the Monte Luna
 333 necropolis, are noteworthy not only because of their unusual prone position, but also for the
 334 presence of perimortem trauma. The necropolis, and the people buried within it, is of
 335 significant interest from a cultural perspective as it provides an insight into a critical period of
 336 transition from the Punic to the Roman dominion for the city of *Santu Teru*.

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337 *The trauma and its cultural significance*

338 T27.2 presents with multiple traumatic lesions, one healed fracture of the right clavicle and
339 two cranial, possibly perimortem, lesions.

340 The cranial lesions are in the posterior aspect of the lambda suture in the occipital bone and
341 on the right frontal bone. The occipital lesion (Figure 8) is typical of blunt force trauma most
342 likely from a direct force such as from a fall, landing on the back of the head. Intentional
343 cranial trauma is often associated with multiple traumatic lesions, often including facial
344 trauma, and the lesions often occur on the left side (Guyomarc'h et al., 2010). T27.2 does
345 have trauma on the left side and has another cranial trauma on the frontal bone, however this
346 lesion does not fit the typical pattern of interpersonal violence-related trauma. In addition, the
347 posterior fracture is within the 'hat brim line', suggesting the lesion is most consistent with an
348 injury sustained from a fall (Kremer et al., 2009). It cannot be discounted, however, that the
349 woman has fallen after being intentionally pushed.

350 The lesion on the right frontal bone, as discussed above, is quadrangular in shape and is
351 typical of penetrating (sharp force) injuries (Wedel and Galloway, 2004; Amadasi et al. 2016;
352 Facchini et al. 2008). The distinctive shape of this perimortem lesion is reminiscent of the
353 square-shaped cross-section of nails commonly used in Roman times. Such nails can be
354 directly compared to those found in the coeval and nearby site of Sisini (D'Orlando, 2019)
355 (Figure 10). The Sisini nail has a cross-section of 7.5 mm x 7.5 mm, which, considering the
356 taphonomic changes, is consistent with the measurement of the trauma (9.5 mm x 9.5 mm).
357 The nail length is 103 mm and this helps to exclude the possibility that the nail exited at the
358 occipital lesion, as the sagittal measurement from the frontal trauma to the occipital lesion is
359 160 mm. The significance of a potential nail being used around the time of death is more
360 fully discussed below.

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361
362

Figure 10 Nail from Sisini. (Lai, G.).

363

364 *The burial archaeology*

365 Tomb 27 is a pit-tomb carved in the stone of the hill of Monte Luna. The funerary artefacts
366 include burial objects from a transition phase between Punic and Roman cultures that date
367 back to the Mid-Republican period of the Sardinian timeline. Based on the contemporary
368 presence of the overstruck coin and the Punic Black gloss pottery cup, Tomb 27 is dated into
369 the 2nd century BC perhaps from the first decades of the 2nd century BC.

370 The funerary artefacts also suggest that there was a widespread shared culture in the rural
371 landscape of Cagliari and its hinterland during the Punic-Roman ages. A locally made
372 *balsamarium* (ointment jar) found in Tomb 27, is similar to a form commonly found in the
373 Tuvixeddu necropolis (Bartoloni 2000, p. 91) and in the Santa Lucia funerary area (Gesico,
374 SU) (Tronchetti 1996, pp. 999-1000) (Figure1).

375 The entire funerary context of Tomb 27, including the placement of objects in the tomb, is
376 more typical of a single deposition, rather than two interments. As supported by the findings
377 in the nearby necropolis of Mitza di Siddi, in which the number of artefacts in singular
378 depositions in Tombs 67 and 113 (same chronology as the Tomb 27 of Monte Luna) (Cocco
379 2009, pp. 60-63; 80-83) is similar to the number of artefacts in Tomb 27, it is possible to
380 hypothesise that the prone individual, T27.2, may have been interred without any objects. As
381 such, T27.2 may exhibit further evidence of deviancy (Shay, 1985). Therefore, there are

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382 multiple lines of evidence to support the case of Tomb 27 representing an unusual funerary
383 rite: the prone position of the body, the perimortem cranial trauma, and the lack of artefacts.

384 Ethnographic sources suggest a wide range of reasons for the prone deposition of an
385 individual including as punishment for a perceived fault. For example, the Merovingian King
386 Pepin “asked to be buried face down for the sins of his father” (Taylor, A., 2008, cited in
387 Gilchrist and Sloane, 2005, p. 154). But perhaps the most common explanation is related to
388 *necrophobia*, mostly associated with a fear that the corpse could disturb the living (Tsaliki
389 A., 2008). These transcultural superstitions across the Mediterranean region were linked to
390 witches, werewolves, vampires, and other mythical creatures (Quercia A., Cazzulo M., 2016).

391 Atypical burial rites have also been associated with contagious diseases and epidemics in
392 antiquity (Tsaliki A., and Taylor, A., in Murphy, E. M., 2008, pp. 18-32; 102-123). For
393 example, *Pliny The Elder*, in *Naturalis Historia* (AD 77), describes a connection between a
394 cross-eyed person and beliefs about an evil eye. This led to Romans’ beliefs around other
395 misunderstood diseases such as epilepsy, or so called *morbo sacro*, that was previously
396 described by Hippocrates of Coos (5th century BC) in one of the first scientific treatises
397 written on the topic (Hippocrates, *De Morbo Sacro*, 4). The disease was thought to include a
398 powerful element of impurity both for the individual and for their community since they
399 believed that epilepsy was contagious. For this reason, the treatment of the victims was
400 mostly related to a purification rite dedicated to the divinity responsible for the sickness.
401 *Pliny the Elder* wrote in the 1st century AD, that if a person died from an epileptic seizure
402 it was suggested to nail the part of the body in which the trauma began to prevent the
403 diffusion of the disease, miasma, into the community (Pliny the Elder, *Naturalis Historia*, 28
404 17, 63) and requires purification.

405 This raises the possibility that the frontal bone lesion in T27.2 was created by a ritual nail,
406 though not necessarily left in the tomb, as other sacred nails usually are as attested in
407 religious contexts elsewhere in the Mediterranean. Sacred nails are usually marked with
408 sacred symbols indicated as *charakteres*, letters and signs inscribed on a magic object, which
409 are common in Graeco-Egyptian, Judeo-Christian, and other religious practices (Bevilacqua
410 2001). Such sacred objects were associated with auspicious and apotropaic functions. Nails
411 were a powerful symbol in ancient times usually associated with the concept of *defigere*,
412 meaning to fix down or fasten something. In a religious context, these objects are linked to
413 specific rituals. The ritual of the *clavum figendi* (to nail) was used to celebrate recurring or

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414 official events, such as the foundation of a temple or the beginning of a new year. They are
415 linked as well to the *tabulae defixionum*, curse tablets (usually made of lead), which were
416 pierced by nails and hidden in places near to the underworld such as necropolises or wet
417 places as the water was a useful medium to link the living and the dead (Dungworth, 1998).
418 The practice described by Pliny is clearly linked to the power attributed to nails, which could
419 prevent or avoid a particular occurrence (Bevilacqua 2001, p. 133). The use of a ritual nail on
420 a person usually occurred after death, however it is difficult to be certain that the perimortem
421 frontal lesion in T27.2 occurred just before or after death, such is the nature of perimortem
422 injuries.

423 One such hypothetical explanation for T27.2 may be that they were suffered a series of
424 epileptic seizures that could have first resulted in the clavicle fracture. A subsequent seizure
425 may have led to the blunt force trauma to the occipital bone, perhaps occurring as the woman
426 fell or knocked their head against something hard. In fact, as presented in contemporary clinic
427 literature, people affected by epilepsy are three times more likely to injure themselves and
428 among the most common types of injury (that might be seen on a skeleton) are head injuries,
429 fractures, and dislocations (Nguyen et al., 2009; 2013; Camfield et. al., 2015). The blunt
430 force trauma after an epileptic seizure may have been the cause of death and the sharp force
431 trauma was inflicted around this time to prevent the miasma associated with the epilepsy
432 spreading to the community.

433 Prone burials are also sometimes carried out on people who have committed particularly
434 harsh crimes (Tsaliki A., and Taylor, A., in Murphy, E. M., 2008, pp. 18-32; 102-123). This
435 is deemed unlikely in this case, based on the evidence that T27.2 was buried in another
436 person's grave, possibly a relative (based on epigenetic factors), within the community
437 necropolis and not an outcast.

438

439 *Conclusion: Tomb 27 and its wider significance*

440 The bioarchaeological analysis of a single tomb in the Monte Luna necropolis, Tomb 27, has
441 detailed some striking possibilities around life and death and the cultural perception of these
442 during a period of significant cultural change from Punic to Roman. While, it is clear that
443 T27.2, a young woman, suffered perimortem cranial injuries, the sequence of events and
444 cause of these injuries is not conclusive but give clues and raise the possibility of a significant
445 perimortem funerary rite associated with disease, a nail, and prone burial. This highlights the

446 potential superstitious nature around death most similar to Roman Era culture, suggesting that
447 Roman cultural practices had already been put in place at this early stage of the transition
448 from Punic to Roman culture. Such analyses can focus on the nuances of life in the past,
449 closer to the day-to-day realities of people in past communities in contrast to the larger scale
450 histories of empires and battles.

451

452 ***CRedIT Declaration***

453 **Paba R.:** Conceptualization, Methodology, Formal analysis, Investigation, Visualization,
454 Writing - original draft, Writing -review & editing.

455 **D'Orlando D.:** Conceptualization, Methodology, Formal analysis, Investigation,
456 Visualization, Writing - original draft, Writing -review & editing.

457 **Willis, A.:** Writing -review & editing.

458 **Luglie', C.:** Methodology, Review

459 **Domett, K.:** Conceptualization, Analysis, Writing -review & editing.

460

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471

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