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Examining the burial contexts and trauma patterns of fallen Soldiers and Civilian Victims from the Spanish Civil War: A comparative investigation

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1. Abstract

This paper compares the context of the burials of combatants with the burial circumstances of civilian victims from the Spanish Civil War and the dictatorship that followed, along with the biological profile and trauma patterns of the remains and associated artefacts. The burial context of the 41 individuals from two cemetery mass grave sites were compared to remains from the International Brigades that were found outside in Central Spain. The biological profiles and skeletal trauma were assessed followed by a statistical analysis of the trauma patterns. Different patterns were apparent regarding material culture associations such as in the presence of ammunition with the brigadiers who had been left where they died in combat whilst the civilians had few personal effects. Trauma patterns were also compared among the different sites and the trauma sustained by the Brigadiers differed from the civilians who had been killed. Awareness of differing patterns common to combatants and civilians during the Spanish Civil War can assist in efforts to identify remains from this conflict.

Keywords: Spanish Civil War, Burial Context, Mass graves, medicolegal investigation, forensic anthropology, International Brigades, trauma analysis

2. Introduction

The Spanish Civil War was initiated by a coup against the democratically elected Republican government on the 18th of July 1936. This army coup was led by General Francisco Franco, who after the Civil War ended in 1939 remained in power until his death in 1975. Franco's nationalists were supported by, among others, monarchists, land owners, the Catholic Church and fascist Italy and Germany (Graham 2005; Congram, Flavel, and Maeyama 2014; Ríos et al. 2014; Passalacqua et al. 2015; Preston 2016; Owens 2021). Many, if not most, of the deaths

during the Civil War and first few years of the dictatorship, occurred away from the front lines through the extra-judicial execution of Republican loyalists (Congram, Passalacqua, and Ríos 2014). Some of the most recent sources (Herrasti, Márquez-Grant, and Etxeberria 2021; Etxeberria et al. 2021) estimate around 150,000 missing persons and between 150,000 – 200,000 soldiers who died in combat. These civilian deaths often occurred in the context of judicial processes involving court martials, incarcerations, and firing squads (Congram, Passalacqua, and Ríos 2014; Congram, Flavel, and Maeyama 2014). Victims of (extra) judicial killings were interred in different kinds of mass graves and different deposition sites across the country, which can be distinguished according to when or where these sites were created; whether they contained civilians or combatants; whether those inside were victims of assaults by the Republican or Nationalist sides; and the number of bodies. Additionally, cemetery mass graves can be distinguished by whether the executions took place within the civil section of the cemetery or outside of its walls (Congram, Passalacqua, and Ríos 2014).

At the end of the dictatorship, families of the fallen victims started exhuming some of these mass graves, as very little effort had been taken prior to this to excavate them (Kerangat 2023). Many of the remains of both the Republican and Francoist soldiers had been moved to the Valley of the Fallen (now called Valle de Cuelgamuros) in 1959 located in the Sierra de Guadarrama near Madrid, along with some Republican victims, which is one of the reasons most of the focus has been on exhuming the civilians instead (Etxeberria et al. 2021; Herrasti, Márquez-Grant, and Etxeberria 2021). It wasn't until the year 2000, that excavations involving scientific professionals started, with over 850 graves and/or mass graves having been opened up since (Ríos, Ovejero, and Prieto 2010; Congram, Passalacqua, and Ríos 2014; Etxeberria et al. 2021; Owens 2021). With most of today's exhumations focusing on exhuming civilian mass graves, little has been published in the academic literature on the excavations of the graves of Republican soldiers. Many of the soldiers were left where they had died, while sometimes they

would be interred in shallow graves dug by their compatriots or would be left inside of war structures such as bunkers, or moved to local cemeteries by their fellow combatants, local residents or sometimes family members (Benito Sánchez et al. 2021; Herrasti, Márquez-Grant, and Etxeberria 2021; Etxeberria et al. 2021).

Several mass graves of combatants have been excavated since the end of the dictatorship. Most of these were located along the three major fronts of the Civil War: the Northern Front, the Ebro Valley, and the area around Madrid. Only a few exhumations have taken place in the latter (Herrasti, Márquez-Grant, and Etxeberria 2021).

While the literature on mass graves of civilian victims of the Spanish Civil War is relatively broad and research into the remains Civil War frontline soldiers is expanding (Penedo et al. 2009; Herrasti et al. 2014; Domínguez et al. 2017; Benito Sánchez et al. 2021; Herrasti, Márquez-Grant, and Etxeberria 2021), there is a lack in the published record when it comes to examining and comparing civilian with combatant contexts together. The current study compares features and patterns that are characteristic of the burial or deposition of the remains of individuals killed from these two different contexts.

This will be undertaken by comparing burial locations, burial characteristics, the biological profile, the condition and/or preservation of the remains, as well as the objects and other items found associated to the remains. An overview of the differences in trauma patterns will also be explored.

3. Materials and methods

The current study compares samples of human skeletal remains from clandestine graves from two cemetery sites in Ciudad Real (Spain) that contained civilian victims (Benito Sánchez and Márquez-Grant 2022b; 2022a).

The excavations at the civil part of the Municipal Cemetery of Almagro was undertaken in April/May 2021 by the Universidad Complutense de Madrid (UCM) and Cranfield University (CU). The anthropological analysis took place at the Laboratory of Forensic Anthropology and Odontology at the Universidad Complutense de Madrid (LAOF_UCM) at the end of 2021. The civil part of the cemetery of Almagro is located to the South of the Catholic Cemetery. It is in a walled enclosure that measures about 9x6 meters. Inside this walled area, was a large marble cross and three small wrought iron crosses that symbolised burials and were removed prior to the excavation. The Civil Cemetery contained 10 graves of different sizes and depths with the remains of a total of 28 individuals. A team of social anthropologists from the Mapas de Memoria project created by the National University of Distance Education (UNED) had assembled a list of the victims with their names, cause of death, date of execution, place of execution, place of origin, professions, and possible place of interment within the different rows of the cemetery. Ten different execution dates were known between the 8th of May 1939 and the 31st of May 1940 with another date much later in 1947 of an individual from prison, i.e. from a slightly different circumstance. Two individuals had been exhumed previously by relatives in the 1960s and 1970s.

The exhumation at the Municipal Cemetery of Manzanares took place in March 2022 by UCM with the anthropological analysis being performed at the beginning of 2023 at LAOF. The Catholic Cemetery contained a total of 288 victims of the Civil War buried in a number of mass graves each the size of a single or family grave with a single grave marker or tombstone. This excavation focused on a mass grave containing 13 individuals. The executions took place on five different dates between the 5th July 1940 and 17th August 1940 (Benito Sánchez and Márquez-Grant 2022b).

The cemetery used to be separated into civil and catholic zones during this time by a wall that

was later demolished in the 1980s and relatives were able to indicate the location of the clandestine graves in this area.
The names, age at death in years, date of execution, profession and origin of the 13 individuals of this particular grave were obtained through witness statements and archival records. From records, it is known that there were six individuals in the first layer, four in the second layer in contact with each other within their respective layers and then, three separate layers with an individual in each that were all executed on different days.
The excavated mass grave measured 2.05 meters in length, 0.84 meter in width on the North end and 0.62 meter on the South end. The first human remains were found at a depth of 1.20 meters and the final depth was estimated to be just under four meters.

In addition to the two above sites, three sets of remains curated at the LAOF_UCM were analysed as part of the sample for the study on combatants.
The remains were recovered during the 1970s when a wildfire hit the Casa de Campo park near Madrid. A forensic investigation was opened into the remains. An old report by professor Reverte of UCM from the 1980s (Reverte 1984)reveals that the remains were likely to have belonged to 3 soldiers part of the International Brigades that had come to fight on the Republican front during the Spanish Civil War. These individuals were likely part of the Madrid frontline at Casa de Campo between 1936 and 1939. Their identity remains unknown.

The remains were inventoried using adapted skeletal recording forms whereby the presence and preservation of each skeletal element was quantified according to the amount of taphonomical damage observed (Buikstra and Ubelaker 1994; Langley et al. 2016). Biological profiles were assessed using commonly accepted anthropological methods. For the estimation of the biological sex, morphological methods for the skull and pelvis set out in Buikstra and Ubelaker (1994) and White and Folkens (2005) were used on a five point scale from possible male, probable male, indeterminate, probable female to possible female. This was complemented with

metric estimation from the long bones (Muñoz García 2018). To determine whether the remains were from adult individuals (i.e. belonging to individuals over 18 years of age) methods set out by Schaefer, Black, and Scheuer (1996) were used for epiphyseal fusion of the long bones, medial clavicle fusion, and sacral fusion. Adult age estimation was performed mainly on the sternal rib ends (Isçan, Loth, and Wright 1984) and the pubic symphyses (Brooks and Suchey 1990). For stature, equations developed for an Iberian population were used that were developed by Mendonça (2003).

The timing of the traumatic lesions was assessed using macroscopic characteristics such as the presence of healing and the smoothness of the fracture edge as well as the colouring of the lesion compared to the surrounding bone relating to how fresh the bone was at the time the failure occurred (Kimmerle and Baraybar 2008; Sorg 2019; Ubelaker 2019). The trauma mechanism was determined by using the type of force applied to the bone and the size and velocity required to result in the fracture observed (Kimmerle and Baraybar 2008). The relevant trauma mechanisms include sharp force trauma, blunt force trauma, blast trauma and high-velocity projectile trauma. Finally, for high-velocity projectile or ballistic trauma, entrance and exit wounds were differentiated according to the visible bevelling around the defect to determine the direction of the trauma and the size of the defect was measured to see if this could give some indication of what weapon may have been used (Kimmerle and Baraybar 2008; Galloway, Zephro, and Wedel 2014).

Statistical analyses and plot preparation were carried out using in R (R Core Team 2024). A chi-squared (χ^2) test was used for the analysis of a possible preferential trajectory of the gunshot wounds observed in the individuals of each site, using a Fisher's exact test for the comparison between Almagro because some of the expected χ^2 values were too small. Fisher's exact test was also applied to study the differences in trajectories between graves (or layers, depending on the site), as well as to compare the distribution of trauma by anatomical region between

Almagro and Manzanares. χ^2 test was additionally used to determine whether there was a significant association between the number of entry wounds in the skull and their location.

4. Results

4.1. Location and context of burial

Both the Almagro and Manzanares graves were situated in a walled enclosure adjacent to the main Catholic Cemetery in the so called Civil Cemetery.

The exhumation in Almagro consisted of 10 graves with a different number of individuals in each, the distribution of which can be seen in Table 1. For Manzanares, consisted of one grave with different layers: six individuals in contact with each in the first layer, four individuals in contact with each other in the second layer, and then three separate layers with an individual in each (Table 2). However, next to the Manzanares grave that was excavated there are a number of other mass graves located within the Cemetery with an estimated total of 288 individuals distributed among them.

The grave in Manzanares was dug with its long axis along the North – South line, while the Almagro graves were all in an East – West orientation.

No information exists on the exact location where the remains of the individuals from the International Brigade were found in Casa de Campo. The remains were found after a fire ravaged the area several years after the individuals had died, likely during the 1970s. The remains were delivered to UCM for analysis but no protocol or report exists of their exhumation.

[tables 1 and 2 go approximately here]

4.2. Preservation and recovery

The remains of the individuals exhumed from the Manzanares and Almagro graves overall had a good degree of preservation with mostly complete skeletons although often only small hand or foot bones missing. On average, at least 80% of the remains were recovered for both of the Municipal Cemetery contexts from Ciudad Real.

The remains with the poorest preservation condition belonged to the individuals buried deepest in their respective graves with often the trunk being the most affected by decomposition processes and taphonomical alterations. Additionally, there was a high number of fragmented crania due to peri-mortem trauma, especially for Manzanares, where all but 2 crania had to be reconstructed to allow for trauma analysis.

The recovery percentage of the three individuals of the International Brigades found in Madrid were much lower than of the remains from Ciudad Real. The approximate percentages of completeness can be estimated to be around 55%, 70%, and less than 40% for the remains of each combatant. The crania and the pelvic bones showed the most signs of peri-mortem trauma and postmortem damage. Some of the remains were also affected by a fire incident that had likely occurred well-after the burial of the individuals as evidenced by the blackened edges of some of the bones.

4.3. Biological profile

A very similar biological profile is seen across all the different contexts. All of the remains found at Almagro, Manzanares and the individuals from the International Brigade from Casa de Campo belong to men. The different ages for Almagro and Manzanares range from 24 to 56 years for Almagro with a mean of 39.79 years and a standard deviation of 9.77 and from 25 to 60 for Manzanares with a mean of 38.69 years and a standard deviation of 9.07. The three members of the International Brigade were estimated to be between 25 and 35 years old.

4.4.Peri-mortem trauma

4.4.1. Trauma mechanism

Practically all of the peri-mortem trauma found in the skeletons from the Almagro cemetery was high velocity projectile (ballistic) trauma with only a handful of instances of blunt force trauma to the upper limbs or thorax that were identified as being blunt force trauma rather than high velocity projectile trauma due to the lower number of fragments. Specifically, two butterfly blunt fractures on the right radius and right humerus of two different individuals (Reber and Simmons 2015) were found in the Almagro sample, along with some cut marks in the cases of two individuals that had been autopsied prior to their internment. For the Manzanares sample almost all of the trauma observed could be classified as being high velocity projectile (ballistic) trauma, except for four instances of blunt force trauma: two blunt force injuries to the mandible and two to the femur.

For the three skeletons of the International Brigades. The cranial trauma that was observed on these three individuals was likely due to sharp force trauma. All these instances of sharp force trauma may possibly have been caused by a bayonet type weapon in an incisive cutting manner. A single occurrence of blunt force trauma was observed on the left femur of one individual as well as sharp force trauma on the distal epiphysis of the left tibia of another individual.

4.4.2. Trauma distribution

The distribution of the different high velocity projectile fractures in the Almagro sample can be seen in Table 3 . Most of the trauma, for the Almagro sample, was found to be located in the skull with 43 out of 53 overall injuries on 26 individuals being located on the skull. Three lesions were located on the torso, five on the upper limb and two on the lower limb. The two autopsied individuals had been excluded from the trauma analysis due to most of the peri-

trauma being related to the autopsy. Each skeleton had an average of two wounds with four being the highest occurring number of trauma on a single individual. Two of the 26 skeletons analysed for trauma had four lesions. A total of 35% (n=9) of the skeletons had only one single gunshot wound, another 35 % (n=9) had two injuries, while 23% (n=6) had a total of three gunshot wounds. The trauma to the upper limbs was observed on four individuals with one skeleton showing a wound on both the right ulna as well as the right radius. This particular skeleton is the only one that didn't have any cranial trauma, but evidenced a gunshot wound on the right femur. A total of 25 skeletons had gunshot lesions. The average number of gunshot wounds to the cranium was 1.65. This means that 42% (n=11) of the skeletons analysed had only a single gunshot wound to the cranium, 8% (n= 2) of the individuals had three gunshot injuries located on the cranium and 4% or one individual had three gunshot injuries. There was just one case where no ballistic trauma was observed on the skull (Table 3). No statistically significant preferential trajectory was detected either between individuals (p-value = 0.077) or between graves (p-value = 0,403).

In the case of Manzanares, there was a higher proportion of trauma to the torso (19 out of 40 lesions). The average trunk injuries in the Manzanares sample was 1.46, and a total of 19 lesions on the trunk in 13 individuals. The maximum number of lesions per individual amounted to four. A notable lesion on the trunk was a circular hole in the right scapular blade. The Manzanares sample evidenced five overall instances of upper limb trauma along with three instances of trauma to the lower limb, one of these being a gunshot wound to the right femur, and the other two blunt force trauma to the right femur (Table 4). Neither was there evidence of a statistically significant preferential trajectory between individuals (p-value = 0.364) nor between layers (p-value = 0.961) at Manzanares. There does not appear to be a significant association between the number of entry wounds and skull bones affected for either Almagro (p-value = 0.054) or Manzanares (p-value = 0.543). Differences were found in the distribution

of trauma between Almagro (Table 3) and Manzanares (Table 4) along the different anatomical regions (p-value < 0.001).

A limited number of post-cranial trauma was observed on the skeletons belonging to the International Brigade, with only a single occurrence of blunt force trauma on a left femur along with sharp force trauma on the left tibia of another individual. All three skeletons had multiple sharp force trauma lesions to the cranium. The sharp force trauma observed could be best described as chopping injuries.

[tables 3 and 4 and figure 1 go approximately here]

4.4.3. Cranial trauma and direction of trauma

4.4.3.1 Almagro. For this sample, the most common entry location was the occipital bone with 21% of the lesions being observed in this location (8.5/41), followed by the frontal bone at 17% (7/41) and then the parietal bone with 15% of the lesions (6/41) (Figure 2). The most common exit wound location was the left parietal bone (9/40), followed by the right parietal bone (8/40), and then the frontal bone (6.5/40). One bullet/projectile did not exit and was found inside ~~of~~ the cranium (Figure 3). The halves (0.5) in these results correspond to lesions located at the junction or suture between two bones.

The trajectory of the trauma occurred in many different directions. Assessing the direction from the superior view of the skull 8 different trajectories could be considered: anterior to posterior (A->P), and vice-versa (P->A), left to right and vice versa (L->R, R->L) as well as a combination of these such as left posterior to right anterior (LP->RA) (Figure 4).

In total, 23% of the bullets entered from the right posterior side of the skull to exit on the left anterior side (RP->LA), 23% were RA->LP, 15% were P->A, 5% A->P, 10% L->R, 15% LP->RA, 8% (n=3) were LA->RP, and 1 bullet went in a R->L trajectory.

For the trajectory, a superior to inferior, or inferior to superior, or horizontal direction was also examined from a lateral view of the skull. A total of 32% of the trajectories observed went from superior to inferior, 48% inferior to superior, and 20% were horizontal meaning the trajectory went from right temporal to left temporal or from left zygomatic to right zygomatic, for example.

One gunshot wound only had an inferior to superior trajectory with the entry wound being located next to the foramen magnum on the occipital bone and the exit on the medial aspect of the right parietal.

The average diameter of the entry wounds for this sample ranged between 9 and 10.6mm with the minimal diameter being 7mm and the maximum diameter ranging between 7 and 19mm due to damage sustained (Table 5).

When studying the relationship between site and trauma trajectory (mainly anterior-posterior and posterior-anterior), no statistically significant association was found (p-value = 0.100)

[figures 2, 3 and 4; and table 5 go approximately here]

4.4.3.2 Manzanares. All of the 13 individuals appear to have a single gunshot wound to the skull. A total of 11 entry wounds could be identified in the Manzanares sample. The entry location could not be determined for two of the crania due to the state of preservation. Nine exit wounds were identified. Similarly to the entry wounds, the degree of preservation of the remains impeded the identification of the other exit wounds. In one case, a bullet fragment was found inside the skull with no evidence of an exit wound.

The most common entry location was the occipital bone or neck region (i.e. the first few cervical vertebrae) (n=4), followed by the frontal bone (n=3), and the right temporal bone (n=2). The right side of the mandible and the left parietal bone each showed one instance of an entry wound as well, totalling 11 identified entry wounds (Figure 5).

Three of the nine exit wounds were located in the splanchnocranium or facial bones. One exit wounds was identified on the occipital bone, two wounds were located on the junction of the occipital bone with either the right or left parietal bone. The remaining three exit wounds were located on the left parietal bone, the frontal bone and the mandible (Figure 6).

The most common trajectory observed in the Manzanares sample was from posterior to anterior, which occurred in five out of the eleven instances directionality could be determined. There were three instances of an anterior to posterior direction, and two instances of a right to left direction (Figure 7). One particular case, was a bullet that entered without an exit wound, which went in an inferior to superior direction, originating from the first few cervical vertebrae and impacting on the left parietal bone leaving a green discolouration endocranially.

The average diameter of the entry wounds could not be properly determined for this sample due to the state of the remains. Only six entry wounds could be measured with an average diameter of 9.25mm, with a maximum diameter and minimum diameter of 10 and 6mm, respectively.

[figures 5,6 and 7 go approximately here]

4.4.3.3 Casa de Campo. All three of the skeletons from the International Brigades showed signs of sharp force trauma to the cranium measuring between a few millimetres in width and up to 40 millimetres in length in the form of dents and slashes. One individual had a V-shaped incisive cut on the right parietal bone and three perforating incisions on the occipital bone. Another individual displayed signs of perforating sharp force lesion at the articulation between the left parietal bone and the frontal bone, as well as a perforating injury at the junction of the left parietal bone with the occipital bone. The third individual had a non-perforating sharp force lesion on the right side of the frontal bone and another lesion that had broken off part of the lateral aspect of the left zygomatic bone.

4.5. Associated objects/artefacts

Among the artefacts or personal effects recovered in association with the human remains in the Civil Cemetery of Almagro were rings, leather shoes, clothing, belts and belt-buckles, a denture, pencils, a coin, and a lighter. The grave from Manzanares contained rings, an engraved medallion with a name, buttons, the textile of a shirt, a key, shoes, seeds, and a belt-buckle (Figure 8).

In both cemeteries, projectile fragments were found. Most of these fragments were often found impacted and within the intercranial cavity. In the case of Manzanares, rope was found around the wrists but had been cut off to allow for mobility when the individuals were thrown in the grave.

According to the report about the combatants found at Casa de Campo, 4 bullets were found alongside the remains. Three of those were unfired with cartridges and one without a cartridge. At the base of the cartridges, the letters SB can be read which correspond to the ammunition brand Sellier & Bellot fabricated in Prague. Ceramics, buttons, and belt buckles were also found (Figure 9).

[figures 8 and 9 go approximately here]

4.6.Additional observations

In both cemetery sites from Ciudad Real, similar pathological conditions were found related to the ways of lifestyle/living conditions. Particularly, Schmorl's nodes (i.e. small nodules on the bodies of the vertebrae) were found in a large number of individuals from both the Almagro and Manzanares samples on ten out of 28 skeletons and six out of 13 skeletons, respectively. In the combatants, although skeletal completeness was a limiting factor, one of the individuals had signs of periostitis on the left tibia as well as the fourth and fifth metatarsals.

With regard to ante-mortem trauma, one individual from Almagro had a healed fracture on the left clavicle; another on the first right rib, and another showed straight healed fractures on the left 6th through 10th ribs and on the right 5th through 7th ribs. For the remains from Manzanares, antemortem trauma was observed on the right fifth rib on one individual and on the third to fifth right ribs of another.
A single instance of antemortem trauma was found on the remains of the Republican soldiers. Namely a transverse fracture to what appears to be the 5th right rib.

Antemortem tooth loss was observed in 22 out of the 28 individuals from Almagro and in 12 out of the 13 individuals from Manzanares, including in the latter one case of complete tooth loss in both the maxilla and mandible. Additionally, caries could be observed in 13 individuals from Almagro with one instance of a filling, and in six individuals from Manzanares. Odontological analysis on the combatants was limited but no antemortem tooth loss was noted only some caries in two of the three individuals.

5. Discussion

The information available about the three members of the International Brigades found at Casa de Campo turned out to be limited due to the incompleteness and preservation of the remains. In spite of this and the small sample size, some inferences can be made about the differences between the civilians and combatants from these sites. Particularly when it comes to comparing the two cemetery site. The first interesting difference observed in the results is the type and number of objects present among the remains of the combatants compared to the objects found inside the civilian clandestine graves of both Almagro and Manzanares. The bodies of the combatants were likely left where they had died in action while the civilians looked at in this case were buried in walled-off areas of cemeteries with the belongings they had on them that day. Another interesting difference is the fact that unfired ammunition was found along with the remains of the combatants. While in the case of the civilian remains, ammunition was also

found but in the form of impacted bullets inside the crania. This shows a clear difference in the context between the two. Additionally, it was thanks to the markings on the ammunition found along with the combatants that it was determined the individuals had been part of the International Brigades (Reverte 1984).

The remains recovered of the combatants were in a lower state of preservation than those of the civilians from the Municipal Cemeteries of Almagro and Manzanares. This is likely due to the fact that the latter were interred shortly after death and left undisturbed, for the most part until their recovery. While, the remains of the combatants were left out in the open and were therefore exposed to the elements along with the fire incident that eventually led to their recovery that affected some of the bones.

It is important to note the recovery process of the human remains. The combatants were recovered in the second half of the last century and brought to UCM without any documented information on the recovery procedure itself. The remains from Ciudad Real were recovered following scientific and archaeological protocols and their exhumation is well documented with photographs and different reports.

Oftentimes, the graves of soldiers in the field, are shallow or superficial and are, therefore, very prone to weathering, fragmentation, dispersion, cremation or pillaging (Benito Sánchez et al. 2021). Many of them are individual burials rather than 'mass' graves (Herrasti et al. 2014; Domínguez et al. 2017; Benito Sánchez et al. 2021; Herrasti, Márquez-Grant, and Etxeberria 2021). Several exhumations of combatants (Herrasti et al. 2014; Domínguez et al. 2017; Herrasti, Márquez-Grant, and Etxeberria 2021) report the use of natural elements such as caves, or the use of war structures like trenches and bomb craters for the use of a burial site dug by the survivors or their fellow militiamen. This means that there is often a great variation of preservation and recovery among the remains of Civil War soldiers. Especially those that were left exposed to the elements were often in a poor condition and had many parts missing due to

scavenging or pillaging or just due to weathering effects (Penedo et al. 2009; Herrasti et al. 2014; Herrasti, Márquez-Grant, and Etxeberria 2021; Domínguez et al. 2017).

The manner of deposition and orientation is relatively similar among the different civilian execution contexts. Most of them not respecting the traditional Catholic tradition of placing the head in a Westward orientation inside the grave (Congram, Flavel, and Maeyama 2014; Owens 2021). The skeletons at the Almagro site were all supine with their heads toward the East, while the Manzanares victims had their heads mostly towards the South but were prone, supine, or seated and all had flexed extremities. The manner of deposition and orientation seems to differ between the contexts from Ciudad Real, with the individuals from Manzanares having been deposited from the South side of the grave, while the remains from Almagro have the legs extended and the arms flexed in a supine position.

The biological profiles were very similar across all the different contexts with most of the victims being young men. Though the ages of the combatants are skewed towards a more younger age range of 25 to 35 years, compared to that of the civilians with an average of around 39 years for both sites to an age range of 24 to 60 years old between both sites.

The biological profiles of the victims discussed here are very similar to the published literature. Studies have stated that about 96% of the victims of the Spanish Civil War executions are men (Ríos et al. 2014; Etxeberria et al. 2021). It seems that the age of the combatants, often falls within a lower age range. This can be seen by the fact that the maximum age of 35 years old from the age range of the combatants falls below the average age of the individuals from the Municipal Cemetery mass graves which sits at 39 years old. This lower age average in combatants is similar to other findings of young individuals with age ranges from 14 to 40 (Penedo et al. 2009; Herrasti et al. 2014; Domínguez et al. 2017; Herrasti, Márquez-Grant, and Etxeberria 2021). With one particular paper mentioning juvenile soldiers with an age range from 14 to 20 years (Benito Sánchez et al. 2021).

The biggest difference in trauma is the fact that the combatants had mostly sharp force trauma to the cranium, while the civilians mostly only had high velocity projectile trauma in the form of gunshot wounds with very little cases of sharp or blunt force trauma. For the civilian contexts the Almagro sample only showed 10 total (out of 53) postcranial lesions, while in the case of Manzanares 27 out of 40 total lesions were postcranial. The civilian skeletons from Almagro had between zero and four cranial gunshot wounds while the Manzanares skeletons each showed a single cranial gunshot wound. The statistical results also confirmed that there is a significant difference to the trauma distribution between the two cemetery sites (p-value < 0.001).

The findings here on trauma are very similar to other contexts from the Spanish Civil War. Similar cases of high velocity projectile trauma to the skull with little use of other types of weapons such as blunt or sharp force objects (Ríos et al. 2014; Congram, Flavel, and Maeyama 2014; Passalacqua et al. 2015). Little antemortem trauma was observed in the two contexts of civilian executions as opposed to the exhumation by Owens (2021) in Guadalajara where they found signs of multiple assault fractures originating during the weeks prior to death on the remains in the form of healing fractures such as a broken nose, fractured ribs or forearm fractures.

The sharp force trauma observed on the individuals from the International Brigades, however, is dissimilar to other findings on combatants. Champion et al. (2003) reports that combatants are most likely to have suffered from lethal fragment or bullet injuries not citing sharp force trauma directly as a source of trauma observed in combat injury. Other studies on Spanish Civil War combatant deaths also only mainly present instances of ballistic trauma rather than sharp force trauma (Penedo et al. 2009; Herrasti et al. 2014; Domínguez et al. 2017; Benito Sánchez et al. 2021).

The anatomical location after the cranium to be most affected by high velocity projectile trauma seems to be the torso across the literature of Spanish Civil War execution victims. In this study as across the literature, the lower limb seems to be the least affected overall (Congram, Flavel and Maeyama, 2014; Passalacqua *et al.*, 2015; Owens, 2021).

Owens (2021) mentions they found few objects inside their sample from an excavation in Guadalajara too. Similarly to the clothing. However, they seem to have recovered some more personal possessions such as a handmade die and a comb. Like Owens (2021), no evidence of cartridge cases were found in the Almagro and Manzanares excavations or other evidence to suggest that the individuals had been executed inside the graves. Another similarity between the Guadalajara excavation and the two excavations from Ciudad Real addressed in this paper is the frequency with which antemortem tooth loss was observed which is may be indicative of the ways of lives of these victims.

Despite these two sites being cemetery execution mass graves, they do not follow the pattern of directionality mentioned by Ríos *et al.* (2014). On the contrary, no pattern seems to be apparent, especially in the case of Almagro where the entry wounds are widely distributed to both sides of the cranium. Similarly, no significant pattern is apparent between the different graves in Almagro. Additionally, no single cranial bone was found to have a more significant number of entry wounds. The same is true for the Manzanares sample, where no significance was found when it comes to the direction of the gunshot wounds or a preferred entry wound location. When trying to look whether an observable difference existed in the spatial relationship between the assailant and the victim, in other terms whether most of the gunshots were aimed from behind the victim rather than facing the victim no significant difference was found either in both sites, this also helped simplify the difference in the nomenclature of the trajectories between both sites (e.g. posterior-left to anterior-right versus just left to right or anterior to posterior). This lack of an apparent significant statistical difference may have been

due to the small sample sizes, however, from a visual, anthropological perspective a clear pattern in the trajectories is also difficult to ascertain as well as Figures 4 and 7 indicate.

It is interesting to note that very little antemortem data is available for Republican soldiers as they often died without any descendants considering their young ages and their station records weren't always correct (Benito Sánchez et al. 2021) or such as is the case for the combatants they were part of International Brigades and their identity is very hard to trace back due to their possible differing countries of origins. Records of civilians are available, however, as was the case for both of these studies, and families often know about the location of their antecedent's remains but have long been scared to come forward. What has made the identification of Republican soldiers easier in some situations, is that they may have had identity disks on their person when they died (Herrasti, Márquez-Grant, and Etxeberria 2021; Herrasti et al. 2014).

Overall, this study has shown some interesting perspectives into comparing civilian mass graves to remains of combatants from the Spanish Civil War. Additionally, Examining the differences in burial contexts between combatant and civilian victims of the Spanish Civil War can aid in the further identification of the remains. Trauma patterns between combatants and civilians differ in their overall distribution, but also differ between the two different civilian contexts. Objects found alongside remains in mass graves of the Spanish Civil War can be a useful tool for understanding the context of the burial but also may be of particular use for identification. There is definitely room to explore this further in the future, as despite the similarities between both contexts an interesting contrast was found in the treatment and deposition of the remains.

Disclosure statement

The authors report there are no competing interests to declare.

Data availability statement

The authors confirm that the data supporting the findings of this study are available within the article and/or its supplementary materials, with any additional data and reports available upon request.

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Table 1: distribution of individuals among the graves in Almagro

Almagro grave distribution		
Grave number	Number of individuals	ID number
UE 23	2	Sk1001, Sk1002
UE 27	4	Sk2001, Sk2002, Sk2003, Sk2004
UE 034	3	Sk3001, Sk3002, Sk3003
UE 039	2	Sk4001, Sk4002
UE 047	1	Sk5001
UE 024	2	Sk6001, Sk6002
UE 028	3	Sk7001, Sk7002, Sk7003
UE 025	1	Sk8001
UE 030	7	Sk9001/03, Sk9002, Sk9004, Sk9005, Sk9006, Sk9007, Sk9008
UE 026	4	Sk10001, Sk10002, Sk10003, Sk10004

Table 2: distribution of individuals in Manzanares

Manzanares layer distribution		
Layer number	Number of individuals	ID number
UE 07	6	Sk001, Sk002, Sk003, Sk004, Sk005, Sk006
UE 09	4	Sk007, Sk008, Sk009, Sk010
Fill Sk011	1	Sk011
Fill Sk012	1	Sk012
Fill Sk013	1	Sk013

Table 3: trauma distribution Almagro

	Skull	Torso	Upper Limb	Lower Limb	Total
Sk1001	3	1	0	0	4
Sk1002	1	0	0	0	1
Sk2001	2	1	0	0	3
Sk2002	0	0	2	1	3
Sk2003	2	1	0	0	3
Sk2004	1	0	0	0	1
Sk3001	1	0	0	0	1
Sk3002	2	0	0	0	2
Sk3003	2	0	0	0	2
Sk4001	2	0	0	0	2
Sk4002	1	0	0	0	1
Sk6001	2	0	0	0	2
Sk6002	1	0	0	0	1
Sk7001	1	0	0	0	1
Sk7002	1	0	0	0	1
Sk7003	2	0	0	0	2
Sk9001	3	0	0	0	3
Sk9002	2	0	0	0	2
Sk9004	4	0	0	0	4
Sk9005	1	0	0	0	1
Sk9006	1	0	0	0	1
Sk9007	2	0	0	0	2
Sk9008	2	0	1	0	3
Sk10002	1	0	1	0	2

Sk10003	2	0	0	1	3
Sk10004	1	0	1	0	2
Total	43	3	5	2	53

Table 4: trauma distribution Manzanares

	Skull	Torso	Upper Limb	Lower Limb	Total
Sk001	1	2	0	0	3
Sk002	1	0	0	0	1
Sk003	1	1	1	0	3
Sk004	1	2	0	0	3
Sk005	1	1	0	0	2
Sk006	1	1	2	1	5
Sk007	1	1	0	1	3
Sk008	1	0	0	0	1
Sk009	1	4	0	0	5
Sk010	1	1	0	1	3
Sk011	1	3	1	0	5
Sk012	1	2	1	0	4
Sk013	1	1	0	0	2
Total	13	19	5	3	40

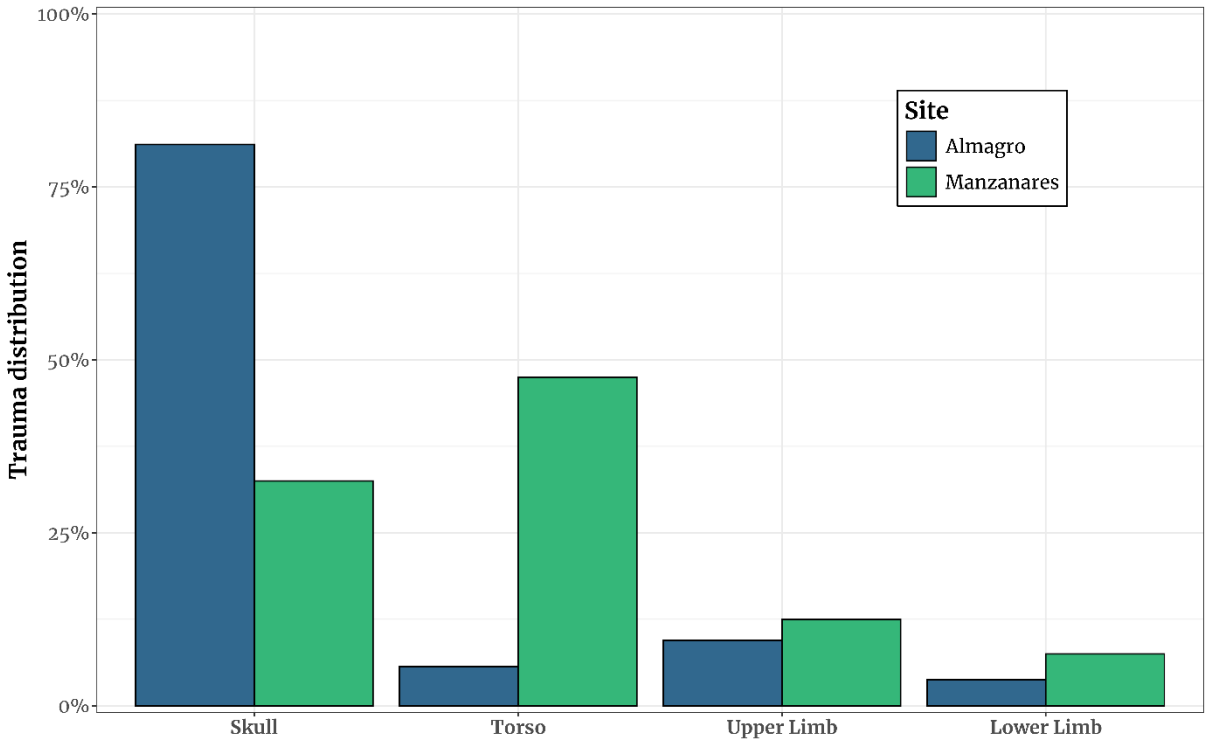

Figure 1: peri-mortem trauma distribution comparison between both cemetery sites

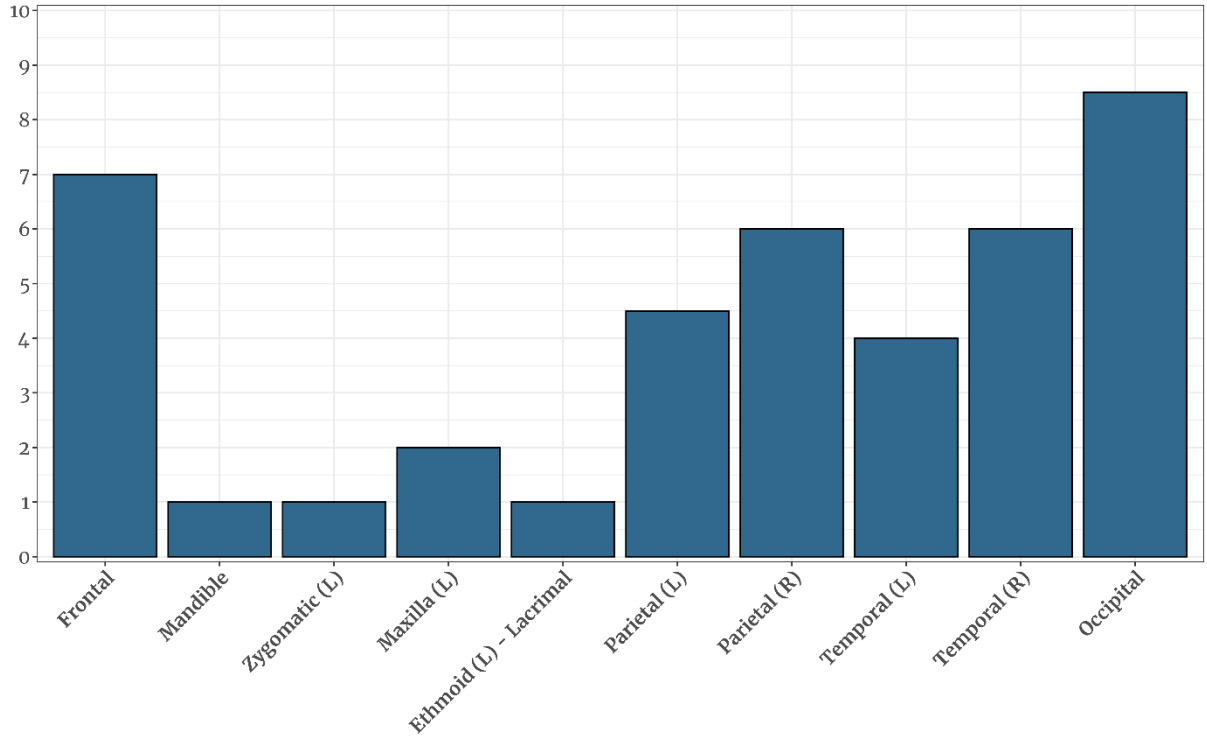

Figure 2: distribution of entry wound locations Almagro

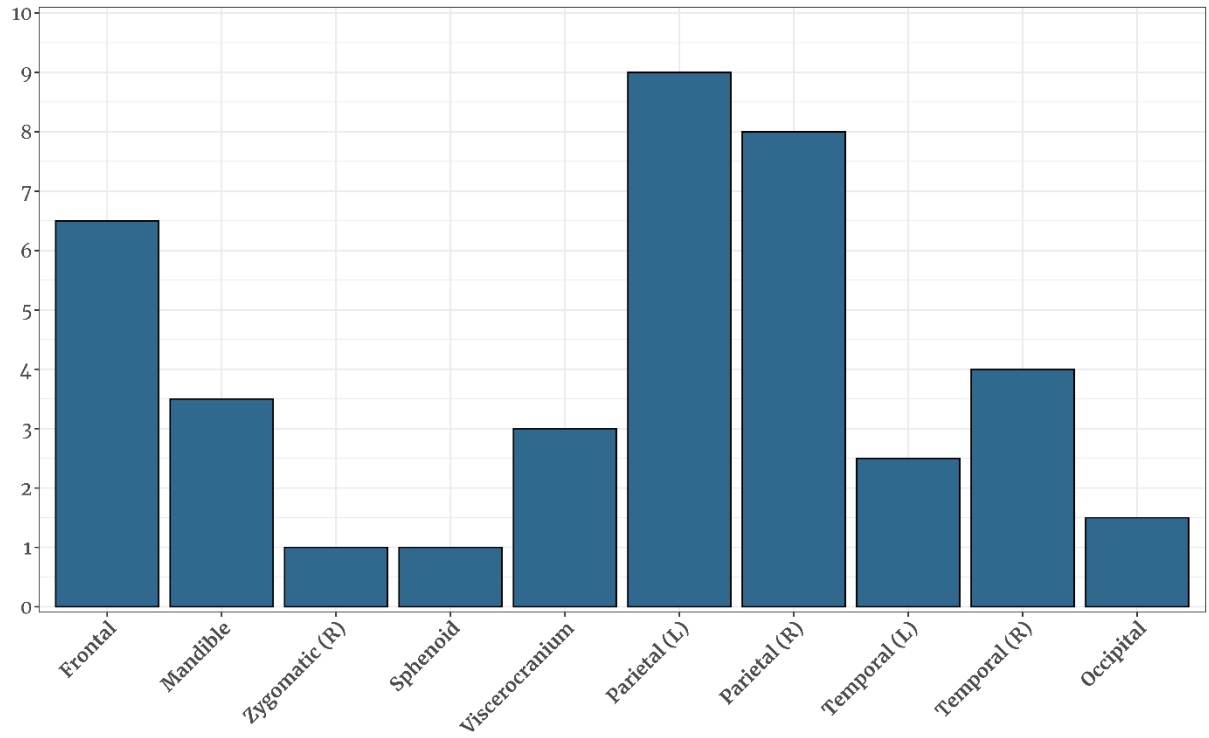

Figure 3: distribution of exit wound locations Almagro

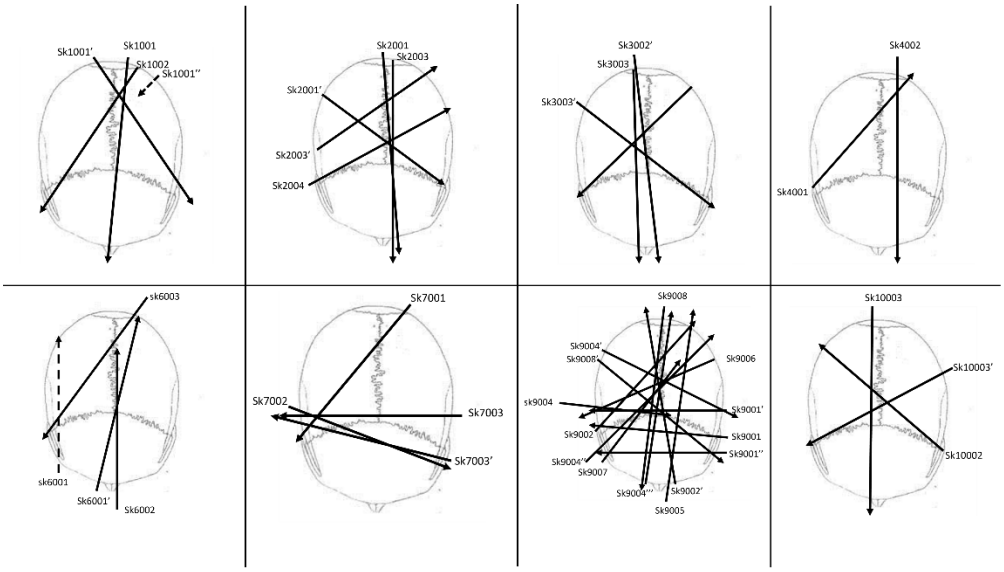

Figure 4: trauma trajectory per grave in Almagro as seen from a superior view

Table 5: diameter of entry wounds in mm Almagro (measured with callipers)

	Max diameter (mm)	Min Diameter (mm)	Average diameter (mm)
sk1001a	11	7	9
sk1001b	19	12	15,5
sk1002	12	11	11,5
sk2001	11	11	11
sk2003	11	9	10
sk2004	11	9	10
sk3002a	13	13	13
sk3002b	15	15	15
sk3003a	10	10	10
sk3003b	15	10	12,5
sk4001	7	7	7
sk6001	9	9	9
sk7001	8	7	7,5
sk7002	11	9	10
sk7003a	11	10	10,5
sk7003b	9	9	9
sk9001a	9	9	9
sk9001b	9	8	8,5
sk9001c	9	9	9
sk9002a	11	6	8,5
sk9002b	9	9	9
sk9004a	14	8	11
sk9004b	8	8	8
sk9004c	9	9	9

sk9004d	7	7	7
sk9006	10	9	9,5
sk9007a	14	10	12
sk9007b	9	9	9
sk9008a	9	7	8
sk9008b	10	6	8
sk10003a	11	7	9
sk10003b	9	9	9

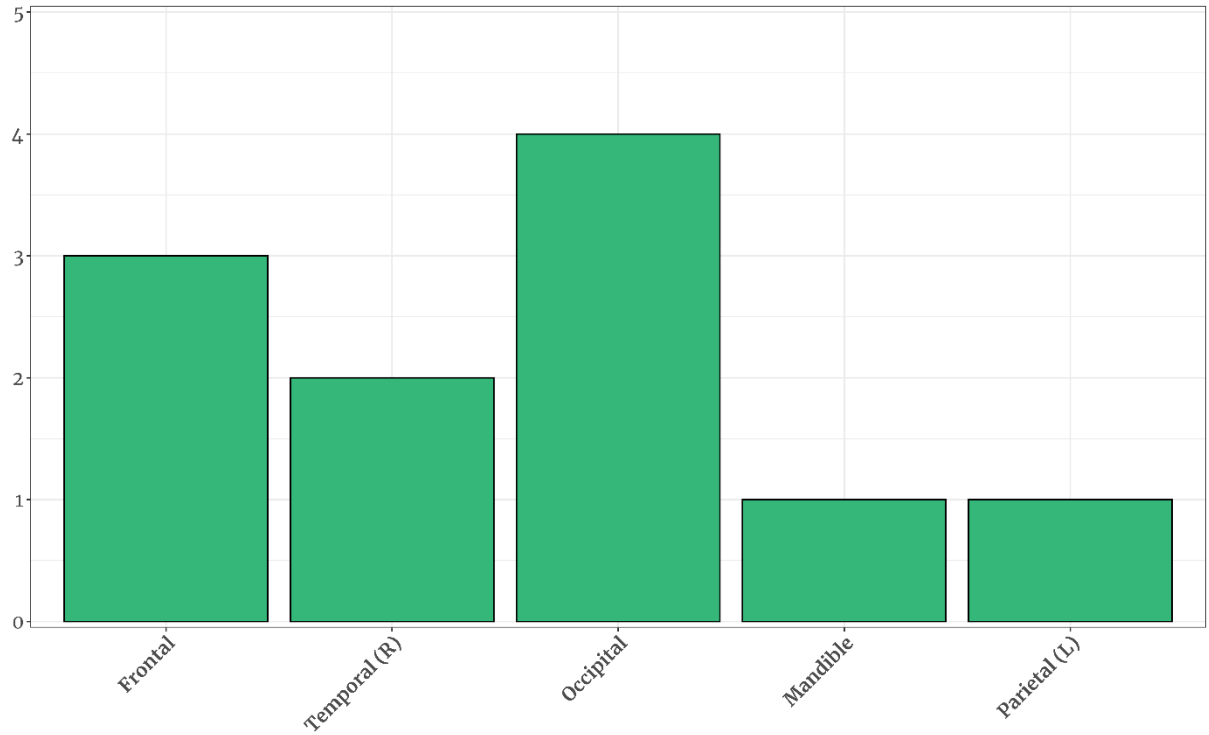

Figure 5: distribution of entry wound locations Manzanares

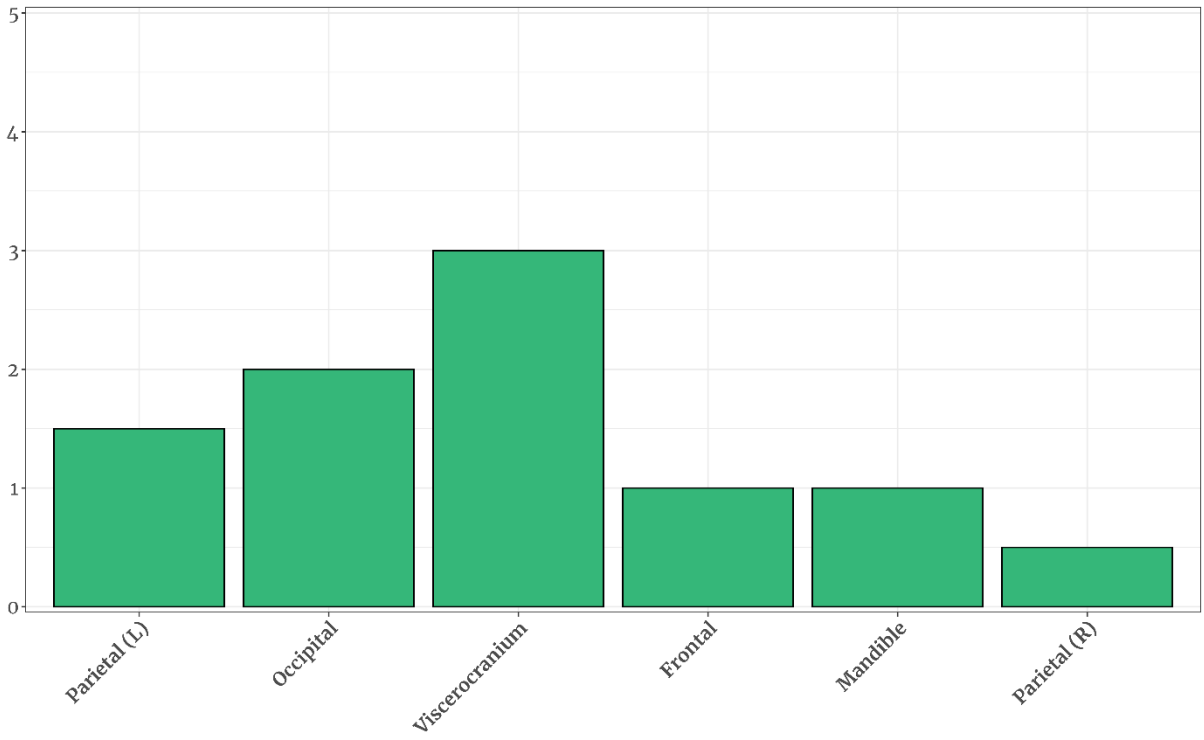

Figure 6: distribution of exit wound locations Manzanares

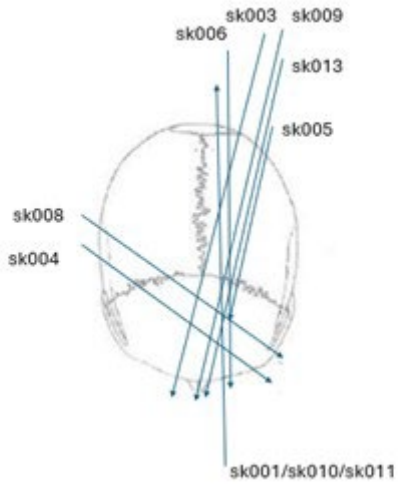

Figure 7: trauma trajectory Manzanares, superior view

Figure 8: objects found on civilians from Almagro mass graves (top to bottom: seeds, a ring, a key)

Figure 9: objects found alongside the remains of the individuals from the International Brigade (top left to bottom right: unexploded cartridges, a belt buckle, ceramic, a bullet)

Examining the burial contexts and trauma patterns of fallen soldiers and civilian victims from the Spanish Civil War: a comparative investigation

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