When Ballistics meets Anthropology: A case study from the Medieval archaeological site Our Lady of Mountain church in Lobor (Croatia)

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Introduction

During the summer archaeological excavation in 2012, on the site Our Lady of Mountain church in Lobor, the grave number 888 was revealed, with human skeletal remains. On the excellently preserved postcranial skeletal remains several circular defects were detected, in the form of penetrating traumas due to a spherical or spheroid body or object activity. Also, traces of blunt force trauma were detected on the body of the right scapular bone. An analysis of such injuries infiltrates in the field of the forensic identification of skeletal traumas with the forensic aspect of ballistics.

Figure 2.
Skeleton of the male person aged 30-35 years (grave 888) in anatomical position, posterior view with grey arrows for shooting wounds, red for the blunt force trauma. Our Lady of Mountain church in Lobor (Croatia).

Figure 1.
Blunt force trauma, the right scapula, view of dorsal surface, the male person, 30-35 years. Our Lady of Mountain church in Lobor (Croatia).

Figure 4.
Metal object embedded into the posterior part of the right tibial bone – detail. The male person aged 30-35 years (grave 888); Our Lady of Mountain church in Lobor (Croatia).

Results

The skeletal remains belong to a male person aged between 30 and 35 years, and 170 cm high (± 3,2 mm). No visible pathological changes were detected on the skeleton. Fracture along the body of scapula as a result of a blunt force trauma extends long and terminates on the lateral third of spina scapulae (Fig. 1).

Unidentified oval or spheroid clump objects are visible on the right humeral bone, the right ilium, and both femoral and right tibial bone (Fig. 2). Deeper penetration of fragments are present on the posterior surface of the right tibia measuring 8,1 x 4,6 mm (Fig. 3 and 4). Other sphenoid or sphenoidal objects embedded into the bone demonstrate shallower penetration: the right humeral bone – posterior (12,9 x 5,3 mm), the right femoral bone – posterior (4,2 x 3,6 mm) and medial (2,5 x 1,7 mm), the left femoral bone – posterior (3,1 x 2,9 mm), and the right ilium – ventral (3 x 4,1 mm), with a greater number of fragments as buckshot dispersed over the area, of different size but less than 1 x 1 mm.

The represented imaging of the qualitative chemical analysis of the elements was obtained on the edge of a defect (a), inside a fragmentary spheroid clump object (b), and on the surface of an unaffected bone (c) (Fig. 5). Generally, X-ray spectrum on all analyzed surfaces indicates presence of Fe, Ca, P, Si, O, Mg and Al in different counts.

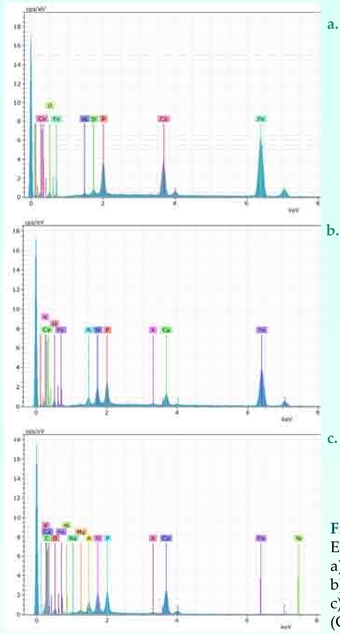
Materials and Methods

The very position of the grave 888 along the apsidal area in a gothic church accentuates the status of this person in the society of the first half of the 19th century. It was a primary burial, the body was placed into the grave in extended position, on the back with the hands crossed over the pelvis, oriented East-West. Three objects as grave goods were found: two bronze buttons and a rosary[1].

The anthropological analysis of the skeletal remains was performed at the Department of Archaeology, Faculty of Humanities and Social Sciences, University of Zagreb. At the Forensic Science Center “Ivan Vučetić”, Ministry of the Interior in Zagreb, the forensic aspect of ballistics and the chemical analysis of penetrating objects were performed.

The anthropological analysis encircles the determination of age at death, sex and stature, under standard macromorphological parameters[2] and pathological changes visible on the skeletal remains. The stature was determined by measuring maximum lengths of the long bones following Pearson’s regression formula[2].

The sampling of a bone with an embedded unidentified object for the morphological and chemical analysis was performed at the DNA Laboratory of the Forensic Science Center “Ivan Vučetić”. An uncoated sample was mounted, introduced into the vacuum chamber and analyzed under a scanning electron microscope SEM/EDX (MIRA3 FEG, Tescan, Quantax EDX 129 eV detector). The chemical analysis was performed on EDX spectra, acquired for 20s (live time) at the accelerating voltage of 25kV.



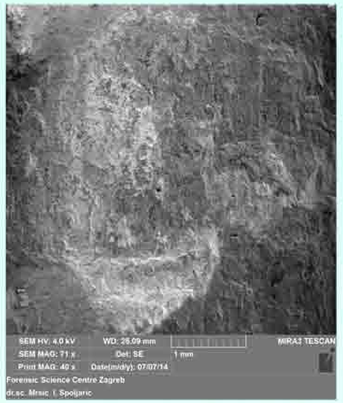


Figure 3.
SEM scan of the injured bone surface, the posterior third of the right tibial bone;
Our Lady of Mountain church in Lobor (Croatia).

Figure 5.
EDX spectrum of the sample showing peaks of Fe, P, Si and Ca:
a) the edge of a metal object and the impact surface,
b) inside the metal object,
c) unaffected bone; Our Lady of Mountain church in Lobor (Croatia).

Discussion and Conclusion

According to the results of the chemical analysis and due to the shape of the mechanical injury it is possible to presume its origin from buckshot. In the first half of the 19th century buckshot was usually fired from smooth bore firearms like a shotgun, a kubur pistol or a domestic production firearm. At that time lead was not as widely accessible as iron, and homemade iron buckshot was a welcome improvisation in the regions rich in iron ore mines and local blacksmiths’ forges. There are three possible processes of iron buckshot substitute: the melted iron casting in adequate molds, the forging of a desired shape in molds, and directly used cold iron drops which arise during the forging process[3,4].

The very position of the described injuries on the posterior part of the skeleton (Fig 1.) indicates shooting at the person from behind[5,6]. The dispersion and intensity of the injuries refer to the fire distance shorter than 15 m.

Further analysis will encompass an evaluation of the traumas in association of the injuries to the skeleton (fracture) with the time of death, together with a more detailed analysis (XRF) of the iron buckshot embedded into the bones.

Literature
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