

A Case of Sharp Force Trauma to the Skull of Female Buried Within a Neolithic Rondel, Kolín (Czech Republic)

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ABSTRACT

In this paper we describe a case of non-healed sharp force trauma to the skull of a young female who was buried within a Neolithic circular enclosure (rondel) dated to the Stroked Pottery Culture (encompassing the period between 5100 BC and 4400 BC) at Kolín (Czech Republic). The girl was buried in a stretched position with her face directed right and her arms folded in the same direction, richly equipped with ornaments made from both freshwater and sea shells. This body arrangement diverges from the style for dead bodies that is typical of this region and time period. The exceptional grave location combined with unusual funerary treatment could reflect a foreign origin or special role in society. In the absence of additional conflict mortality data at the settlement, we conclude that this girl may have died as the result of inter- or intra-group conflict or non-specified homicide, possibly with ritual connotations.

Key words: sharp force trauma, paleopathology, Neolithic, rondel, atypical burial, skull, violence

Introduction

The Middle Neolithic cultural complex referred to as the Stroked Pottery (alternatively Stichbandkeramik, StK) Culture originated in the northwestern region of the Czech Republic during the period between 5100 BC and 5000 BC and lasted until 4400 BC. In the Czech Republic, location of the StK was more-or-less consistent with the distribution of the Linear Pottery Culture that existed immediately preceded it.^{1,2} In a wider European context, the long house settlements typical to the StK Culture have been found mostly in loess areas, spreading from the Morava River to the Saale River. The subsistence strategy that characterised this culture was based on agriculture, grain-growing, and domestic livestock rearing; the associated archaeo-zoological fauna also indicates that minor importance was placed on hunting in terms of animal economy.³ The burial rites of the StK Culture were quite heterogeneous, as the deceased were interred in dedicated burial areas or within settlements. Flexed inhumations and cremations have occasionally been found at one bi-ritual cemetery (as has, for example, been documented at Miskovice, Czech Republic). However, as the relative scarcity of these cemeteries sharply contrasts with the size and

number of settlements, mortuary practices that do not leave archaeological traces are also thought to have been practiced.⁴

People who lived in the StK Culture invested a huge amount of effort in the construction of monumental enclosures surrounded by deep ditches and palisades that may have served as social and ritual centres for the community. These circular earthworks, or rondels, typical of the wider Neolithic period, have a repetitive form that is highly suggestive of deliberate design and symbolism. Rondels appear in several archaeological cultures of the early fifth millennium BC, which developed from the Linear Pottery Culture; their principal features are single, or multiple, concentric ditches, intersected by two, or more, causeways at right angles which provide entrances to the inner space. Generally, there are no traces of settlement structures within these enclosures, while StK rondels are mostly situated on a slightly-sloped terrace close to a spring or river. It has been assumed that although rondels were multi-purpose, there has been a clear leaning towards ritual interpretation as, in most cases, their ditches and

causeways have very few defensive attributes and because ritual artefacts are often found in ditches.^{5,6}

Archaeologically-speaking, there are four basic sources of evidence for prehistoric violence, skeletal traumas, defensive architecture and settlement patterns, weaponry and related artefacts, and iconography.⁷ However, skeletal remains represent the only direct source of information on the degree to which violence was actually practiced.⁸ This is particularly the case in the European Neolithic, as formal weaponry is largely absent from the material culture; at this time, stone tools and domestic implements were adapted as weapons when needed. The Neolithic has typically been viewed as a peaceful time and the predominantly pacific interactions of the »first farmers« are evidenced by their widespread network of exchange.^{7,8} However, an increasing volume of discoveries does indicate that a significantly variable level of inter-group violence and conflicts did take place at this time. Viewed from a larger geographical context, violence was evidently more intense during the Linear Pottery Culture, encompassing the period between 5450 BC and 5050 BC, especially in western regions.^{9,10} In particular, a number of well-known massacre sites, including Schöneck-Kilianstädten and Talheim in Germany and Asparn/Schletz in Austria contain clear osteological evidence for lethal mass violence that can be dated to a rather short period within the later Linear Pottery Culture.^{11,12}

The most relevant sign of organised violence is the high frequency of *perimortem* cranial trauma related to sharp edged and blunt tools together with injuries from projectile weapons. Generally, females have experienced a lower risk of injury in both inter- and intra-group confrontations (for review see⁷).

The main objective of this paper is a detailed description and interpretation of the unique find of unhealed sharp force trauma to a skull of a young female buried in a StK Culture rondel at Kolín (Czech Republic). The combined presence of injury, different body arrangement, and contextual associations make this find exceptional and so we propose several alternative explanations for the circumstances of this death as well as the motivations underlying unusual burial practices.

Archaeological Context

The Kolín site (Czech Republic) is situated within a region of intense prehistoric settlement on the edge of the Elbe River terrace. Rescue excavations carried out in this area (2008–2010) prior to construction of the Kolín bypass road revealed numerous archaeological features, including several burials that can be dated to the StK Culture, encompassing the period between 5050 BC and 4400 BC.

Archaeological data show a remarkable concentration of four StK Culture rondels within 8 km along the bypass route. Of these, the first Kolín rondel is surprising because of its size and the number of ditches. This feature is comprised of four concentric ditches, the outer of which has a diameter of 210 m, while the inner one has a diameter of 140 m and reaches a depth of 5 m beneath present-day ground level. The size of the enclosed area was about 1.6 ha, and the width of the entire ditch system was more than 60 m. This number of ditches means that this monument is unique in the Czech Republic, and its overall diameter makes it one of the largest rondels yet known in Europe. Initial radiocarbon dates suggests that demise of the rondels began as early as 4900–4800 BC.¹³

One of the Neolithic burials (feature 165) was excavated in 2008 in close proximity to the third ditch of the

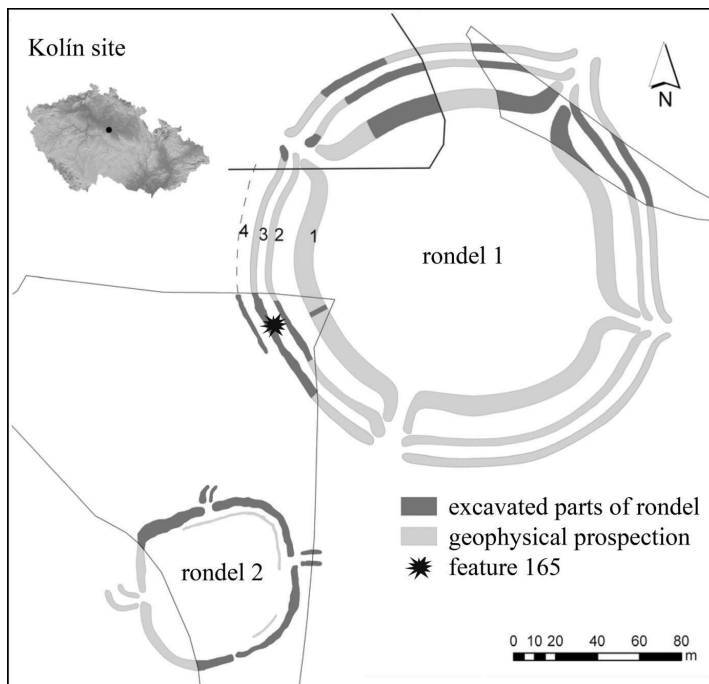


Fig. 1. Map of the Czech Republic showing the location of the Kolín site (left corner) and a plan of the StK rondel 1 area with feature 165 depicted (1,2,3,4 – ditches).

first rondel (Figure 1) and contained the female skeleton described in this paper. The absolute chronology of the grave was established as the interval between 4934 BC and 4780 BC with an accuracy of 95.4%. An oblong grave pit, oriented southeast-to-northwest, included the body placed on its back in an extended position with the head pointing northwest. Although carefully arranged, this body had not been interred according to the relevant burial customs of this period and region; the face was directed and the arms were folded to the right side, the right arm was sharply flexed at the elbow, the left arm bent at a right angle, and the palms met in front of the face at the shoulder level. We have recorded no evidence of bone dislocation (Figure 2a). In addition, although no spectacular ceramic goods assemblage was found in this particular grave, the girl was buried with a series of rich dress ornaments including perforated marine *Glycymeris* shells recovered from her chest and pelvic region (Figure 2b) and a necklace made from shells of the freshwater gastropod *Theodoxus*, collected from the left of her head and neck. Apart from her personal ornaments, additional non-visible gifts may have also been added to the burial.

Methods

Although the unearthed human remains were damaged by decomposition processes and some parts were completely missing, they contained evidence about the body construction, height, sex, age at death and health status of the buried girl. The age at death was estimated based on the degree of skeletal maturation, the dental attrition and the metamorphosis of the auricular and retroauricular surfaces of the ilium, the long bones yielded an estimated living stature.^{14–17} The sex was determined by the presence of feminine cranial and pelvic features,^{14,18} and the sexual diagnosis was confirmed using DNA analysis.

DNA extraction from a molar was performed in a specialised laboratory that was specifically dedicated to the analysis of the ancient samples. The laboratory setup, the

anti-contamination strategies and the preparation of the sample was described previously.¹⁹ DNA extractions were performed using PrepFiler®BTA Forensic DNA Extraction Kit (Life Technologies, USA). All extracts were subsequently cleaned using One Step PCR Inhibitor Removal Kit (Zymo Research, USA). Further inhibitor removal was done using the dialysis.²⁰ The sequencing of mitochondrial D-loop was performed using the method developed for degraded mitochondrial DNA targets.²¹ The results obtained were confirmed by a re-sequencing. Uracil-N-glycolase treatment, often used to minimize the effect of hydrolytic DNA damage²² and subsequent incorporation of a wrong base during polymerase chain reaction, was not used due to the limited concentration of DNA. Haplogroup assignment was done using the HaploGrep 2.0 haplogroup classification tool²³ on the haplotype without »heteroplasmic« polymorphism (16162G, 16519C, 73G, 152C, 263G, 315.1C), which was identified.

Evaluation of osseous lesion was primarily macroscopic, the trauma site was examined under the x10 magnification hand lens to enable the principal diagnostic features to be recognized. Differential diagnosis with those conditions that may produce lesions in the skull was performed.²⁴ We ruled out congenital/developmental defects, pathological lesions due to disease such as infection or malignancy, surgical intervention (trepanning), pseudopathologies (post-mortem damage) and damage produced by animals. In order to assess the origin of the wound and to check if the individual survived to the traumatic event (even shortly) we adopted diagnostic criteria developed by Sauer²⁵, Kaufman *et al.*²⁴, Boylston²⁶ and Lovell²⁷.

Computed tomography further assisted in evaluating the shape of injury profile. CT images of the skull were performed in a coronal plane using a Siemens Somatom Sensation 16 scanner (Erlangen, Germany), the distance between individual slices was 0.5 mm. The machine settings corresponded to a general algorithm that would be

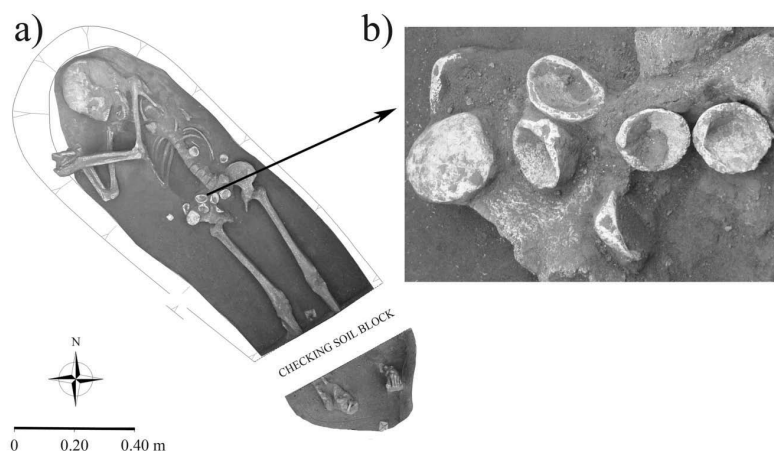


Fig. 2. a) In situ photograph of feature 165 and b) the *Glycymeris* shell ornaments accumulated around the right pelvis of the skeleton.

used to examine the skull of a living patient. To enable three-dimensional visualisation, the skullcap was subjected to optical scanning (smartSCAN 3D-HE, Breuckmann GmbH, Germany). 3D geometric model of the skull was generated in the electronic STL format, which created a three-dimensional mesh of triangles. All skeletal remains are housed at the Institute of Archaeology, Prague, Czech Republic.

Case Description

The human skeleton unearthed from feature 165 belonged to a young female, with a gracile body construction and poorly-developed muscular insertions. The bone surface was affected by erosion and has been etched by plant roots. The skeleton is moderately well-preserved, although the skull has been deformed by soil pressure. Later stages of epiphyseal/apophyseal union still present on the iliac crests and clavicles of this short (151 cm) and lightly-built girl indicate that she was probably 20 to 25 years of age when she died.^{14,16,18} The presence of *cribra orbitalia* on the eye sockets shows that this girl suffered from chronic anaemia of unspecified etiology.²⁸

On the right parietal bone, close to the parietal eminence, a non-penetrating elliptic defect (30 mm x 10 mm, running horizontally) is present that bears the imprint of a sharp object centrally and underlying diploë formation at the bottom of the lesion. The better preserved upper edge of the wound is sharp and clear-cut; based on

features considered diagnostic to *perimortem* injuries, including consistent colouring of both the fracture surface and surrounding bone as well as the absence of signs of healing, this trauma can be identified as having occurred around the time of death (Figures 3a-d, 4). The initial appearance was not modified by surgical repair, healing or due to the effect of infection. Taking all the features of the lesion into account, there was little problem with the diagnosis of the cause of the lesion. The cranial injury had characteristics consistent with sharp force trauma.^{26–27, 29–31} The overall appearance, parameters, and profile of the trauma suggest a sharp force impact caused by a stone-polished weapon tool typical of this period (i.e. a stone axe, axe-hammer or adze). Axes are considered to be both blunt and sharp, as is their impact on the head.³² Therefore, when alteration is classified as sharp force trauma, consideration should be given to possible blunt force component.³³ No radiating stellate pattern or concentric fractures indicative of blunt force trauma were observed. However, the wound displayed features associated with both the sharp cutting blade (incision) and some aspects of blunt force trauma such as lateral pushing back of adjacent bone and fragmenting.^{31, 34–35}

Axes usually produce fatal injuries when used as weapons.³⁶ Assuming that the blow resulted in intracranial bleeding, it could also have caused death. However, in the absence of soft tissue evidence recording potential additional hits, it is only possible to note that the death of this girl was violent.

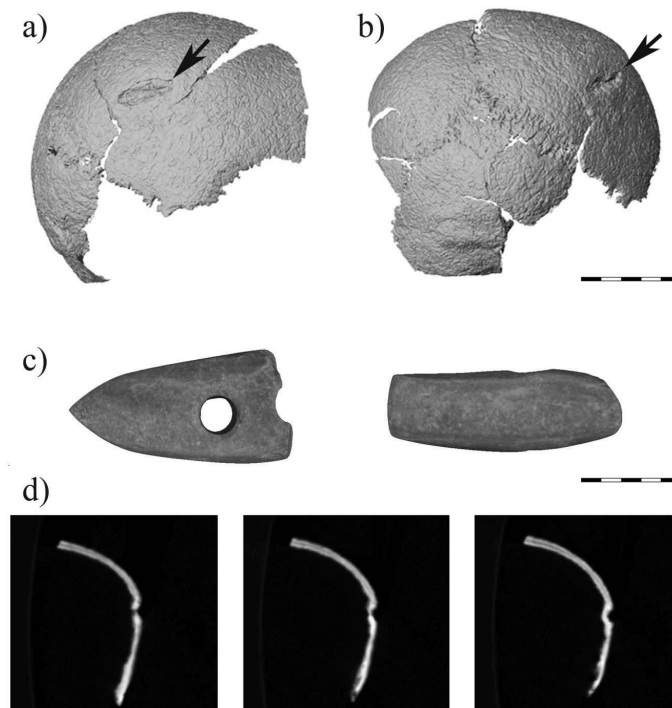


Fig. 3. a) Exocranial optical scan of the right parietal bone to show the unhealed sharp force trauma in lateral and dorsal (b) view; c) an example of a potential weapon, perforated stone axe-hammer (scale bar, 5 cm); d) coronal CT images of the right parietal bone showing the damage of the outer table and inward bulging of the bone.



Fig. 4. Details of the lesion. The arrow points to the upper edge of the wound.

Discussion and Conclusions

Considering injury distribution by skeletal elements, data show that parietals are the most commonly affected cranial bones, as they comprise the largest proportion of the skull vault.³⁷ The case of intentional *perimortem* injury reported here was caused by a recognised weapon type, and although the trauma recorded on the skeleton may not necessarily have been lethal, the death of the girl followed quickly as a result of this or subsequent hits. Taking into account the localisation of the trauma on the lateral-posterior right parietal, it is possible to deduce that the victim was turning away from her aggressor. Such a pattern of injuries, that does not match with that expected from face-to-face encounters, has often been documented in cases of female-directed violence.³⁷ However, despite abundant literature demonstrating violence among Neolithic farmers, no traces of conflicts over territory adjacent to Kolín rondels have yet been recorded.

The remarkable characteristics of this burial, including the placement of the corpse within the rondel, unusual body arrangement, and rich adornment, provide us with several interpretive threads. Because the archaeological record demonstrates that burial rites were prominent features of ancient cultures, any recorded deviations from normal practice require carefully considered interpretation.³⁸ Individuals buried in accordance with unusual rites may have had a special social position due to a difference in origin (e.g. exogamic contacts with the inhabitants of other settlements) or the special position of the family within the community.³⁹ Burials can express social differences in a variety of ways including the enhanced investment of labour, diverse corpse treatments, the large number and value of grave-goods, and grave placement in relation to others.⁴⁰

The first hypothesis presented here links the atypical body arrangement seen in this grave with a potential foreign origin of the buried girl. This is because the burial rite seen in this case is not fully typical to the region and

Neolithic age; the majority of burials at the time are characterised by bodies in crouching positions, most often on their left sides. In addition, although the provision of grave-goods, including ceramic vessels, was customary, the girl in this case was buried just with her ornaments. Placing Kolín 165 burial into a wider geographical context, the nearest parallel Neolithic examples of bodies placed in extended positions are from *Hinkelstein* (5000 BC to 4900 BC)⁴¹ and the chronologically younger *Großgartach* Culture (4900 BC to 4700 BC)⁴² near the upper Rhine River. Similar body and arm positions in burials have also been documented from the chronologically older Linear Pottery Culture from Vendenheim near Strasbourg.⁴³ During the Neolithic, the Elbe region formed part of an apparently extensive long-distance trading network; using strontium isotope signals from human skeletons, Bentley *et al.*⁴⁴ found significantly less variance in geographic signatures in males compared to females. This result is consistent with the patrilineal model that suggests that males tended to remain where they were born, while females often married and moved elsewhere. As a result, it is possible to hypothesise that both the deceased and group preparing the burial had different ancestries, expressed via this specific body arrangement.

The issue of the girl's origin was further assessed by genetic examination of mitochondrial DNA extracted from molars, which yielded the H1a haplogroup. The mitochondrial D-loop haplotype obtained in this analysis (i.e., 16162R 16519C 73R 152Y 263G 315.1C) contains three heteroplasmic polymorphisms not described in Phylotree 17⁴⁵. Haplogroup H dominates present-day western European mitochondrial DNA variability (40%), but was less common (ca. 19%) among early Neolithic farmers and virtually absent from Mesolithic hunter-gatherer populations. Indeed, H1 sub-haplogroups are thought to have spread from a glacial Iberian refugium⁴⁶ and were reported by Gamba *et al.*⁴⁷ from ancient Neolithic sites from France and Spain.⁴⁸ This group shows a consistent and strong exponential growth over the entire course of the

Neolithic⁴⁸ and being relatively frequent, it unfortunately gives no clue to what origin the girl might have been.

Placement of the corpse within the rondel as well as differences compared to the commonly encountered array of StK Culture burial practices can reflect possible ritual, symbolic, or spiritual aspects of the life or death of the girl. She was buried at a socially and religiously significant location at a specific point of time (when the rondel was in use). The presence of the densest network of rondels in central Europe suggests intense communal and sacral activities that went far beyond basic subsistence. The assumption that rondels had a ritual function is strengthened by the excavation of a ceramic bull's head from the third ditch at rondel 1 as well as fragment of face decorated vessel from a feature adjacent to rondel 3 at this site.⁴⁹ Considering biological variables, including age and sex, in combination with the broader archaeological context, we speculate that the buried girl occupied an important position in society. The comprehensive work of Gimbutas⁵⁰ and her 'Living Goddess' theory suggests that Old European women honoured with special grave goods were either spiritual leaders, priestesses or members of a hereditary line of priestesses.

No direct analogues of the Kolín burial have yet been discovered elsewhere and no review study on human remains found within rondels has yet been published. Nevertheless, both ritually deposited burials and corpses treated unceremoniously have been found at, or close to, circular enclosures at other spatially distinct or somewhat younger sites. Human body parts were excavated from the inner area of a StK enclosure in Göseck (Germany), where it appears that the skeleton was knowingly deposited before, or during, rondel construction.^{6,51} Two ritually deposited burials have also been unearthed from a Moravian Painted Culture ditch of a rondel dated to between 4800 BC and 4100 BC at Těšetice-Kyjovice (Czech Republic).⁵²

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Atypical burials in pits or at the bottom of the ditch encircling a rondel have also been found in Michelsberg Culture sites, dated to between 4400 BC and 3500 BC, at Bruchsal-Aue (Germany),^{50,53} while in the very centre of the Lengyel rondel at Friebritz (Austria), dated to between 4800 BC and 4100 BC, an unusual burial of male and female buried face down has been documented.⁵⁴ Deposition of human bodies, or body parts, is also known from a *Großgartach* Culture (4900-4700 BC) rondel at Ippesheim (Germany).⁵⁵ The fact that only single bodies, or at most two bodies, are often found further highlights the importance of the people buried or the ritual (possibly sacrifice) involved.⁵¹ The true nature of Neolithic religious practices, however, remains unclear and there is ethnographic but limited archaeological evidence for ritual killing.⁵⁶

Based on the available evidence, we are unable to definitively reconstruct the events immediately before, and after, the death of the girl buried at the Kolín rondel. However, taking into account palaeopathological results as well as the archaeological record, several interpretations can be suggested and may even be combined. Perhaps this burial records the violent death of a foreign female, a socially privileged or religiously active person, or it records a death due to inter-group violence, individual aggression, or ritual homicide. There is no question that the young woman at Kolín had played an important and specific role in the community; as evidenced by a rich assemblage of adornments, her body arrangement, and the special location of the grave, her life and/or death was likely connected to symbolic-sacral spheres.

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SLUČAJ TRAUME UZROKOVANE OŠTRIM PREDMETOM NA ŽENSKOJ LUBANJI U NEOLITSKOM NALAZIŠTU KOLÍN, REPUBLIKA ČEŠKA

SAŽETAK

U radu se opisuje slučaj neliječene traume uzrokovane oštrim predmetom na lubanji mlade ženske osobe, sahranjene u neolitskom kružnom nalazištu iz razdoblja kulture ubodnotrakaste keramike (između 5100 i 4400 godina prije Krista), u mjestu Kolín (Republika Češka). Djevojka je ukopana u ispruženom položaju s licem i preklapljenim rukama okrenutima u desnu stranu, uz opremu bogatu ukrasima izrađenim od slatkovodnih i morskih školjaka. Ovaj položaj tijela razlikuje se od tipičnog stila ukapanja mrtvih u toj regiji i u tom vremenskom razdoblju i može ukazivati na strano porijeklo osobe ili njezinu posebnu ulogu u društvu. U nedostatku dodatnih pokazatelja smrtnosti kao posljedice sukoba u naselju, zaključuje se da se osim mogućih sukoba unutar zajednice ili s drugim skupinama, moglo raditi i o nespecifičnom ubojstvu s mogućim ritualnim značenjima.

