

Fatal Wounds in a Late Neolithic Double Inhumation—a Probable Case of Meningitis Following Trauma

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ABSTRACT

Among a group of seven skeletons from the southern part of Lower Saxony, dating to the Single Grave Culture (ca. 2500 BC), was a double inhumation, which showed an unusual burial position for one of the individuals interred. Deviating from the typical squatted position, this male was supine. Having been badly injured by an arrow shot into the back, he suffered from post-traumatic paraplegia and, most probably died from bacterial meningitis caused by the flint tip that penetrated the spinal cord. This infection was also responsible for the burial position, clearly pointing to an opisthotonus, which is indicative of the final stage of bacterial meningitis. The other individual, also male, had an arrow wound and died from the complications of a severe wound to the intestines.

Key words: late neolithic; arrow wounds; meningitis; palaeopathology.

Introduction

Whenever an ancient human skeleton which shows signs of trauma is excavated, it reminds us particularly that, in addition to our scientific curiosity and interest in the underlying events, there are individual tragic fates connected with the respective victims. Thus, the description and interpretation of what happened, or of the trauma that may finally emerge as the lethal injury, should always keep in mind the peculiarity and the exceptional feature of violence revealed by a palaeopathological diagnosis. The unusual is, in many cases, also reflected by the burial, whether in terms of a mass burial or in any deviant position of the inhumed individuals. This holds true for the case to be presented here, a double inhumation of two men who most probably received fatal arrow wounds.

Description of the find

On an archaeological site next to the village of Bavenstedt in the vicinity of Hildesheim in Lower

Saxony the remains of seven individuals from the late neolithic period ('Einzelgrabkultur', ca. 2500 BC) were excavated. Six were found in a squatting position typical of late neolithic burials from the region of that time.¹ Of the two other individuals, interred together in close physical contact, however, one was supine, and an explanation was sought for this atypical posture.²

The double inhumation (Bavenstedt 86/109, no. 3) was orientated in a northeast–southwest direction with the skulls facing to the northeast (Figures 1 and 2). Both individuals were males, specimen number 1, on the left-hand side, was 35–45 years of age and number 2, on the right hand side, was 30–40 years old.

Specimen number 1 was buried in a left-sided squatting position with his left forearm resting under the right half of the thorax of specimen number 2 and his right forearm resting on it, so that the right hand had been placed on the shoulder of the left individual. The lower extremities showed a moderate degree of flexion at the knee-joint. Some bones had been lost due to destruction by an excavator before the



Figure 1. Inhumation of two victims of arrow wounds from the late neolithic period at Bavenstedt, Hildesheim, Germany. The star marks the position of the flint tip that hit specimen number 1 (left). The area, where the flint tip penetrated the vertebral column of specimen number 2 (right) is indicated by the arrow.

recovery of the inhumation. Proximal fragments of the right humerus was transported to the lower parts of the thoracic vertebral column by old disturbance of the burial.

Specimen number 2 was lying supine with the skull resting on its left side. The arms were found in extreme flexion at the elbow-joint so that the forearms were lying directly on the upper arms. Digits 2–4 of the left hand were twisted laterally and the thumb was placed between the proximal half of the humerus and the ribs, indicating that the thumb was extended; the right hand was similarly placed. It is somewhat improbable, but it cannot be excluded that the position of the hands was due to post-mortem change. The position of the vertebral column obviously was not due to post-mortem alteration. To the left of the cervical



Figure 2. Drawing to show the intertwined skeletal elements of the two individuals.

vertebrae there was a fragment of the left radius. Of this individual, only the skull, arms, and thorax were preserved. With the exception of two fragments of the left innominate bone, all the skeletal parts below the second lumbar vertebra were lost when an excavator removed the soil above the inhumation before preparation.

Description of the traumatic lesions

During the recovery of the skeletons two flint arrowheads were found, the positions of which allow for a plausible reconstruction of the arrangement and position of the two bodies, and their probable cause of death.

With specimen number 1 a flint tip was detected in the upper abdominal region between the distal thirds of the flexed forearms



Figure 3. Section of the vertebral column of specimen number 2 with the flint tip *in situ* between the 8th and 9th thoracic vertebrae.

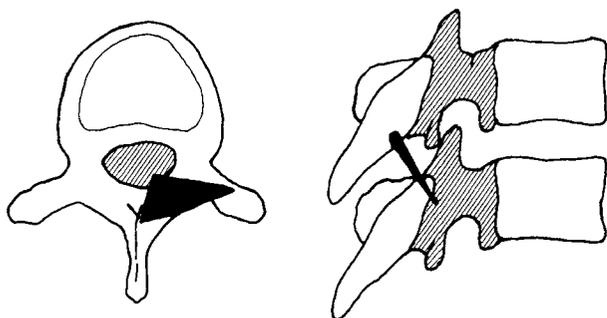


Figure 4. Diagram of the position of the flint tip showing the vertebral cord lesion. Left: cranial view of the 9th thoracic vertebra. The shape of the tip is due to perspective foreshortening. Right: lateral section of 8th and 9th thoracic vertebrae. Hatched areas mark the vertebral canal.

(Figure 1, star). The arrow had most probably penetrated the abdominal wall and produced a perforation of the adjacent intestines. These lesions then resulted in extensive internal haemorrhages, possibly followed by peritonitis. As no other traces of trauma were seen in the skeleton, the individual very likely died within a few days of the complications connected with this intestinal wound. It cannot be excluded, however, that the flint tip did not penetrate the soft tissue, but was carried by the individual in a textile or leather bag close to the body. This, however, would not explain the simultaneous interment with specimen number 2, which is undoubtedly indicated by the burial position of the two individuals, or at least would make it rather unlikely.

Individual 2 was found with a flint arrowhead still stuck in the back (black arrow, Figure 1). The

projectile was a retouched and almost equilateral triangle with an edge length of 24 mm. It hit the individual on the right-hand side between the 8th and 9th thoracic vertebrae (Figure 3) and lodged in the intervertebral space. The penetration must have been considerable, as both the superficial and deep musculature was cut completely. In addition, the lateral portion of the spinous process of the 8th vertebra was pushed through in its upper third, the energy of motion being sufficient to drive the tip into the spinal cord and affect the dura mater (Figure 4).

Discussion of probable effects

The effects of this severe lesion can be interpreted in two ways. The first point to consider is that, owing to the complete severance of the

external and internal venous plexuses of the vertebral column, a haematoma was produced by epidural bleeding. The formation of oedema around the area injured is also likely. If the

penetration of the flint tip was sufficiently deep the spinal cord also may have been damaged. In both cases the lesion was likely to have resulted in paraplegia, either gradual or instantly, after the



Figure 5. Histological section from cranial base at the left fossa cranii posterior of the occipital bone. The lamina interna (arrows) shows a smooth surface and no signs of an inflammatory reaction. Scale in μm .

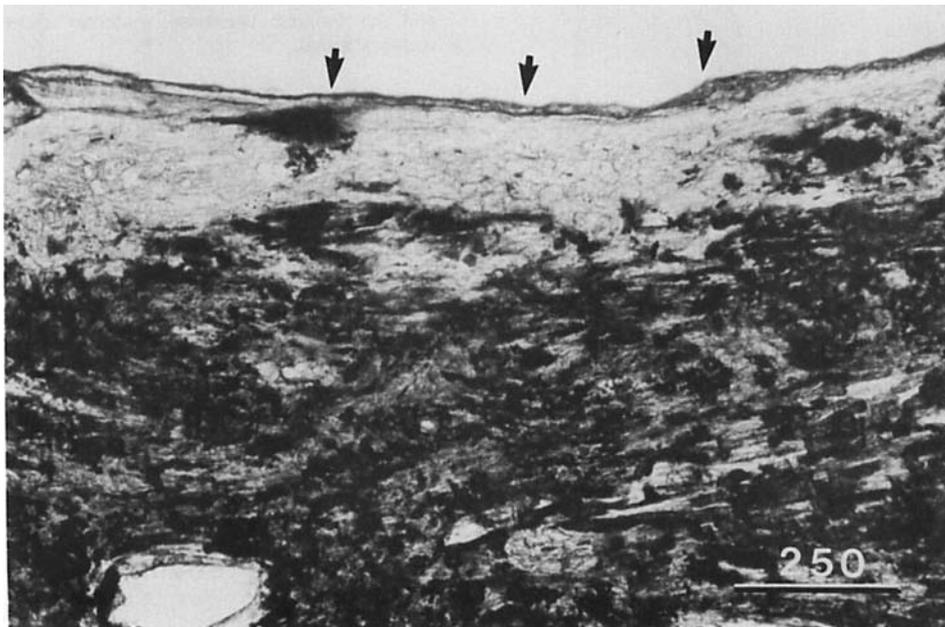


Figure 6. Tenth thoracic vertebra; histological section of the interior surface of the vertebral arch (arrows). No signs of osseous inflammatory reaction can be seen on the bony surface next to the trauma. Scale in μm .

trauma, leading to paralysis and complete immobility of the individual from the 11th/12th vertebra down.

Second, the projectile probably caused meningitis propagated by bacterial infection.³ This interpretation is confirmed by the position in which specimen number 2 was interred. Contrary to individual 1, who exhibits the typical squatted position of a late neolithic burial, specimen 2 was found supine with unnaturally flexed arms. Such a pronounced flexion of the extremities together with extended hands and a reinforcement of the lordosis in the vertebral column by overstretching is referred to as opisthotonus.⁴ It is reported to be among the typical visual signs of acute meningitis caused by a bacterial infection. It is this posture, characteristically deviating from any relaxed position, in which the affected individual finally dies.

In situ, only the position of the arms and hands could be detected for individual 2, but the position of the abdominal parts and the legs, can be inferred because the soil above the inhumation was removed by an excavator, probably taking off the elevated parts of the lumbar region, the hips and the lower extremities.

Despite these clear hints, the diagnosis of opisthotonus caused by an ascending meningitis must remain uncertain. Death may have been caused by a severe soft tissue injury, e.g. by a dagger. Flexion of the arms, similar to that found here, may be caused by injuries of the cervical and (upper) thoracic spinal cord without any signs of opisthotonus. The position of arms and hands could, of course, be due to the way in which the individual was placed for interment, although this is not very likely because the findings do not give any hint of a deeply dug pit. If, however, meningitis occurred and persisted for some time, there should be traces of inflammatory reactions in the adjacent bones. To check this, thin-sections were prepared from an area of the left fossa cranii posterior of the occipital bone next to the foramen magnum, and from the medial parts of the vertebral arches of the 6th and 10th thoracic vertebrae (Figures 5 and 6). In neither case were signs of osseous reactions visible, either in the superficial bone layers of the lamina interna or the vertebral arches.

Therefore, if the diagnosis of acute bacterial meningitis is correct, it led to death within a short time—within a few days. There are, nevertheless, a few examples showing that traumatogenic meningitis caused by arrow wounds can be survived for a longer period.⁵ Considering, however, that severe lesions of this kind could not be treated adequately at that time, the interpretation given here seems even more likely. Moreover, the archaeological interpretation of this finding suggests that the situation does not represent a late neolithic burial proper, but rather an 'emergency inhumation'. This can be seen as additional evidence for the chronological coincidence of this double interment.

A number of comparative cases of arrow wounds are reported in the literature.⁶⁻¹¹ Although presumably fatal, none of these finds, however, could be associated with an acute spinal inflammation caused by a penetration of the spinal canal as indicated for the case presented here.

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