

THE OLDEST KNOWN CASE OF A MANDIBULAR CONDYLAR PROCESS FRACTURE

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Background: Mandibular neck fractures account for a substantial proportion of mandibular injuries in modern populations, but evidence for such trauma in archaeological contexts is extremely limited. Their rarity reflects both diagnostic challenges and high mortality historically associated with post-traumatic infections. Only few healed condylar injuries are known from historical (Roman and medieval) periods, making Neolithic cases exceptional.

Objective: The aim is to characterize the morphology and healing of the oldest known isolated low-neck fracture of the mandibular condylar process and to contextualize its implications for survival and community care.

Subjects and methods: The individual BK4_79, a 30-35-year-old female, represents the Lengyel culture from the area of today's Brzesc Kujawski (north-central Poland). Macroscopic examination was combined with radiographic imaging (Scan eXam One) and cone-beam CT (Carestream CS 9600). Trabecular architecture was analysed using MaZda 4.6. Regions of interest were taken from the fracture zone and normal trabecular bone of the condylar head. Texture parameters – entropy, difference entropy, and long-run emphasis – were used to calculate the Bone Index. Differences between sites were tested using one-way ANOVA ($p < 0.05$).

Results: The right mandibular condylar process exhibited an antero-medial displacement consistent with lateral pterygoid traction, along with a characteristic annular periosteal reaction around the neck. Radiographic analysis showed overlapping fragments, cortical continuity, and complete bony union without pseudarthrosis. The Bone Index was significantly lower in the fracture region (0.91 ± 0.04) than in the reference condylar head (0.94 ± 0.03), indicating increased corticalisation associated with remodelling. Asymmetric molar wear on the right side reflects long-term occlusal imbalance caused by shortening of the ramus.

Conclusions: The successful healing of the fracture indicates a closed, isolated injury that allowed full consolidation, and shows that the woman survived for years after the trauma. These findings highlight biological resilience and suggest social support within Neolithic communities.

Keywords: Condylar fracture; Mandible; Paleopathology; Neolithic; Poland.