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Human Skeletal Remains from the Exterior of the Zápoľský Chapel in Spišský Štvrtok

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ABSTRACT

During the restoration of the Zápoľský Chapel in the village of Spišský Štvrtok, eastern Slovakia, archaeological excavation uncovered ten incomplete graves as well as 1024 bone fragments that were found in a frame of a surface survey in the Chapel's exterior. The skeletal remains can be according to the excavated artifacts dated approximately to the 17th–18th century, which is a period when the church, the chapel and the monastery in Spišský Štvrtok were under the care of the religious order of the Minorite friars. The aim of the study was to determine the age, sex and height of the individuals in the graves and to calculate the minimal number of individuals (MNI) of the skeletal remains in the surface collection. Their health status was also evaluated by monitoring their pathological conditions. Among the pathological conditions, inflammatory bone changes (osteomyelitis and periostitis), neoplasms, and dental pathologies were present. Of interest was the presence of *processus epicondylaris* on the humerus of the individual in the grave nr. 5, which is rare in humans and may have been related to some increased strenuous activity. This anthropological research could contribute to the historical knowledge of the site and the population that lived in Spišský Štvrtok, Slovakia. Probably, many of the skeletal remains belonged to members of the Minorites and also to citizens of the village Spišský Štvrtok. However, the origin of the skeletal remains is unknown even after anthropological research and it is a good reason for deeper discussion and further analyses.

1. Introduction

The skeletal remains of interest in this study were found during the archaeological reconstruction of the Zápoľský Chapel of the Assumption of the Virgin (or Zapolya's Chapel) at the Church of St. Ladislav (Figure 1), which stands on a hill on the northern border of the village of Spišský Štvrtok in eastern Slovakia (49°00′09″N, 20°27′47″E). The village of Spišský Štvrtok is geographically located on the south-western edge of the Levoča Hills at an altitude of 520–600 m asl. The village was probably formed at the end of the 12th century around the Church of St. Ladislav, and later on, in the 14th century, it developed into a market town and a seat of royal lancers, which was a troop of Medieval infantry operating in the Spiš region, assigned to protect the northern borders of Hungarian Kingdom (Guldan *et al.*, 2011). The construction of the gothic two-storey chapel on the south wall of the church has been attributed to the Zápoľský (Zapolya) family around 1473, but research has shown that it was built earlier between 1456 and 1468 by the Henckel de Quintoforo and Thurzo de Bethlenfalva families in the style of the French royal chapels (called Saint Chapelle) (Buran, ed., 2003; Tajkov and Balogh, 2022). The Zapoľský Chapel is today one of the most important examples of Gothic architecture in Slovakia. It is distinguished from the church by its style of construction and the shiny green tiles on the roof (Dunčko, 1998). Later, to the south-west of the Church of St. Ladislav, the Minorite monastery was built in 1671 and it was connected to the church and chapel by an underground passage (Javorský, 1998). The interior of the Chapel itself was divided into two floors: the upper one in the form of an oratory, and the lower one, partially submerged below ground

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Figure 1. The Zápoľský Chapel in Spišský Štvrtok. Author: Arpád Balogh.

level – supposedly serving as a funeral crypt (Janko, 2006). Notably, however, the crypt of the Chapel is conspicuous in its complete lack of tombs, which has also been confirmed by archaeological excavation. Stefan Zapolya had initially wanted to be buried in the Chapel in Spišský Štvrtok, but then changed his mind and was interred in his subsequently-commissioned mausoleum in the Spiš Chapter (Spišská Kapitula) (Buran, ed., 2003).

In 2022, archaeological excavation of the chapel in Spišský Štvrtok was undertaken as part of the planned monument restoration of its damp masonry. Archaeological excavation has not confirmed the presence of graves or their fragments in the interior of the Zápoľský Chapel. The typology and dedication of the Chapel indicate that the structure had a funerary function, though members of neither the Thurzo family nor Zápoľský family were buried in it (Janko, 2006). The graves were documented by probes only on the southern exterior in a relatively superficial layer of dirt on a high bedrock. Based on the excavated artifacts, the skeletal remains can be dated approximately to the 17th–18th centuries. The floor plan of the chapel with markings of the graves and their situation is shown in Figure 2 (Tajkov and Balogh, 2022). Ten graves were found and a large number of fragmentary bones from several individuals were also collected as part of the surface collection during the archaeological excavation. Subsequent anthropological research aimed to observe the

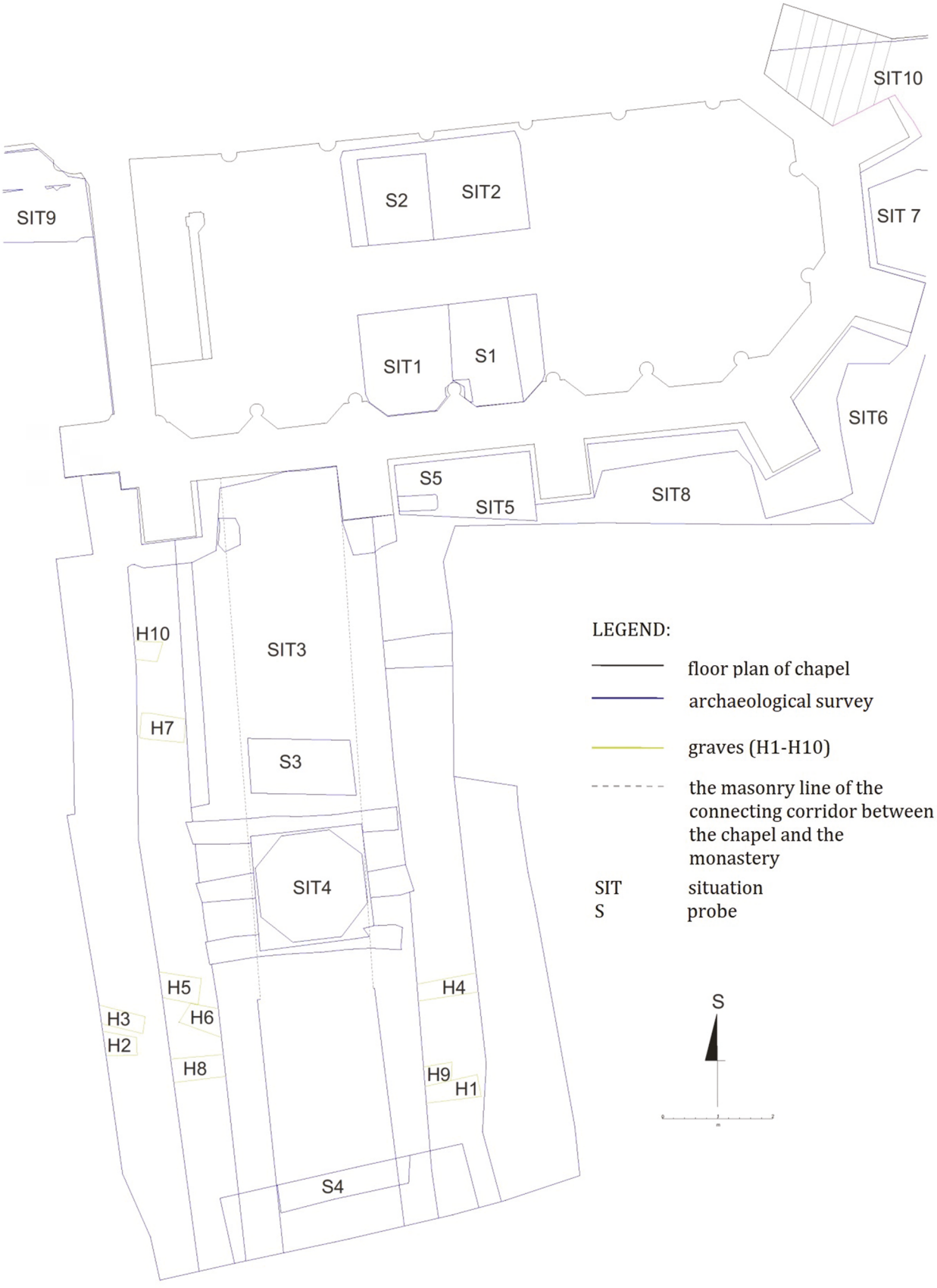

Figure 2. The floor plan of the Zápoľský Chapel with markings of the graves. Authors: Peter Tajkov and Arpád Balogh.

anthropometric parameters (age, sex and height) of the skeletal remains and to determine the minimum number of individuals from the surface collection. Morphoscopic or epigenetic features, pathological and taphonomic changes on the skull and postcranial skeleton were monitored, which it was hoped would provide information about the population living in this area.

2. Methods

All anthropological procedures performed in the study were in accordance with the ethical standards of the research committee of the University of Prešov (no. ECUP012023PO) and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Ten graves, marked from 1 to 10, were discovered during the archaeological excavation. The graves contained incomplete skeletal remains. A further 1024 fragments of human bones found in a frame of a surface survey were included. Animal bones were automatically discarded from the research directly when encountered at the archaeological site.

Metrical analysis of the human skeletal remains was done by a digital calliper, an osteometric board and a body tape measure. Some of the skeletal remains were in relatively poor condition and the fragmentary state of some bones did not allow the estimation of sex, height, or age determination of the individuals. This fact influenced the choice of methods.

The methods used to determine sex of analysed individuals included:

- assessment of the morphoscopic features on the skull according to Walrath *et al.* (2004);
- estimation of the mandibular ramus flexure according to Loth and Henneberg (1996),
- assessment of the processus mastoideus according to Saini *et al.* (2012),
- measurements circumference of the head of the humerus or the femur according to Černý and Komenda (1980),
- measurements of the clavicle and scapula according to Papaioannou *et al.* (2012),
- measurements of the talus and calcaneus according to Curate *et al.* (2021),
- pelvic bone measurements by the DSP2 software (Diagnose Sexuelle Probabiliste v.2) (Brůžek *et al.*, 2017).

Table 1. Anthropometric characteristics of skeletal remains from graves 1–10.

Grave nr.	Sex / methods		Age at death (years) / methods		Height (cm) / methods	
1	male	measurements talus sin. and calcaneus sin.	>25	epiphyseal fusion	NA	NA
2	male	measurements talus sin. and calcaneus sin.	>25	epiphyseal fusion	165.55±4.11	maximum length of tibia sin.
3	male	measurements talus sin. and calcaneus sin.	>25	epiphyseal fusion	167.36±4.11	maximum length of tibia sin.
4	NA	NA	12–15	length of humerus dx.	NA	NA
5	male	measurements scapula dx.	20–25	epiphyseal fusion dental wear	NA	NA
6	female	morphoscopic features on the skull, mandibular ramus flexure, measurements clavicle dx., circumference of the head of humerus dx.	18–20	epiphyseal fusion, dental wear	NA	NA
7	IND	mandibular ramus flexure, DSP2 method, incisura ischiadica major, measurements clavicle sin., measurements processus mastoideus sin.	17–25	epiphyseal fusion, dental wear, an evaluation of facies auricularis	NA	NA
8	male	DSP2 method, incisura ischiadica major, circumference of the head of humerus sin. and femur sin.,	>25 <40	epiphyseal fusion, an evaluation of facies auricularis, an evaluation of facies symphysialis,	167.7±3.85	physiological length of femur sin.,
9	female	measurements talus sin.	>25	epiphyseal fusion	160.56±4.06	maximum length of fibula sin.
10	NA	NA	>25	ectocranial suture closure on calvarium	NA	NA

DSP2 – prob abilistic sex diagnosis method by Murail and Bružek (2005); dx. – dexter; IND – indifferent, NA – not-analysed; sin. – sinister.

The methods used to determine age at death included:

- estimation of the epiphyseal fusion by Stloukal *et al.* (1999),
- estimation of the dental wear according to Lovejoy (1985),
- evaluation of facies auricularis according to Buckberry and Chamberlain (2002) and facies symphysialis according to Todd (1920),
- assessment of the ectocranial suture closure according to Meindl and Lovejoy (1985),
- age at death determination in non-adults by Florkowski and Kozłowski (1994).

The estimation of body height was made by measuring the maximum or physiological length of the long bones according to formulas based on Caucasian samples for both sexes (Sjøvold, 1990). A minimum number of individuals (MNI) was determined for the skeletal remains from the surface collection by the traditional method according to White (1953). Identification of human bones, estimation of sex and detection of the pathological conditions were done using gross morphological traits and the appearance of the osseous remains. All pathological conditions, nonmetric traits or taphonomic changes observed were recorded and photographed.

3. Results

3.1 Anthropometric characteristics of individuals in graves

The graves numbered 1–10 contained the incomplete skeletal remains of individuals. The absence of suitable bones and/or bone fragmentation did not allow the use of all available methods to identify age and sex in some individuals. The results of the anthropometric measurements and the methods used in estimating age, sex, and height are presented in Table 1. For each individual, only those methods that could be applied to assess specific characteristics based on the preserved skeletal remains are listed. We identified five male individuals and two females. The individual in grave 7 was determined as indifferent (methods: by DSP2, incisura ischiadica major and mandibular ramus flexure estimate as male; by measurements clavicle and processus mastoideus estimate as female). Sex could not be determined for the individual in grave 4 and 10. The majority of the individuals were in the age group of 25 years or more. One juvenile individual was present in grave 4. The body height could only be determined from the long bones of individuals in graves 2, 3, 8 and 9.

3.2 Anthropometric characteristics of bones from surface collection

During the archaeological excavation, 1024 human bones and fragments were found in the surface collection. The inventory of human skeletal remains is given in Table 2. We calculated a minimum number of individuals (MNI) by dividing the skeletal elements of the surface collection into right and left and used the most abundant number as the final estimate. The results of the MNI calculation are summarised in Table 3. The MNI from the surface collection was 35 based on the maximum number of right femurs.

Table 2. The inventory of human skeletal remains from the surface collection.

Region	Type of bone	Number of fragments
Skull	Cranial vault and base	20 – frontal fragments 14 – occipital fragments 26 – parietal fragments 10 – temporal fragments 1 – fragment pars basilaris 3 – sphenoidal fragments 4 – unspecified fragments
	Maxilla	10
	Mandible	16
	Teeth	10 – incisors 6 – canines 2 – premolars 7 – molars
	Os hyoideum	2
Pectoral girdle	Clavicle	22
	Scapula	31
Thorax	Ribs	155
	Sternum	1 – body of sternum 1 – manubrium sterni
Vertebral column	Vertebrae	18 – cervical 33 – thoracic 31 – lumbar 17 – os sacrum 7 – unspecified fragments
Upper limb	Humerus	61
	Ulna	54
	Radius	28
	Hand	1 – os trapezoidum 1 – os scaphoideum 26 – ossa metacarpi 10 – phalanx
Pelvic	Os coxae	73 fragments
Lower limb	Femur	93
	Patella	2
	Tibia	78
	Fibula	29
	Foot	20 – talus 26 – calcaneus 2 – os cuboideum 6 – os naviculare 3 – os cuneiforme laterale 3 – os cuneiforme intermedium 49 – ossa metatarsi 12 – phalanx

Table 3. Estimation of the minimum number of individuals (MNI) based on bones from the surface collection.

	Humerus n (%)	Ulna n (%)	Radius n (%)	Femur n (%)	Tibia n (%)	Fibula n (%)	Calcaneus n (%)	Talus n (%)	Scapula n (%)	Clavicle n (%)
Total (NISP)	61	54	28	93	78	29	26	20	31	22
Right side	13 (21.31)	23 (42.6)	8 (28.57)	35 (37.63)	25 (32.05)	8 (27.59%)	11 (42.31)	3 (15.00)	13 (41.94)	15 (68.18)
Left side	28 (45.90)	19 (35.18)	14 (50.00)	30 (32.26)	19 (24.36)	12 (41.38)	14 (53.85)	17 (85.00)	14 (45.16)	6 (27.27)
Unsided fragments	20 (32.79)	12 (22.22)	6 (21.43)	28 (30.11)	34 (43.59)	9 (31.03)	1 (3.84)	–	4 (12.9)	1 (4.55)
MNI	28	23	14	35	25	12	14	17	14	15

MNI – minimum number of individuals, NISP – number of identified specimens, n – number.

Table 4. Estimation of adult age based on bones from the surface collection.

	Humerus n (%)	Ulna n (%)	Radius n (%)	Femur n (%)	Tibia n (%)	Fibula n (%)	Calcaneus n (%)	Talus n (%)	Scapula n (%)	Clavicle n (%)
Adult	43 (70.50)	39 (72.22)	23 (82.14)	57 (61.29)	37 (47.43)	24 (82.76)	25 (96.15)	20 (100)	18 (58.06)	16 (72.72)
Non-adult	10 (16.39)	14 (25.93)	4 (14.29)	29 (31.18)	24 (30.77)	2 (6.90)	1 (3.85)	–	9 (29.03)	4 (18.18)
Unidentified age	8 (13.11)	1 (1.85)	1 (3.57)	7 (7.53)	17 (21.80)	3 (10.34)	–	–	4 (12.90)	2 (9.10)

n – number

Table 5. Estimation of sex based on bones from the surface collection, regardless of the side.

	Humerus n (%)	Femur n (%)	Calcaneus n (%)	Talus n (%)	Scapula n (%)	Clavicle n (%)
Female	4 (6.56)	1 (1.08)	3 (11.54)	4 (20.00)	3 (9.68)	10 (45.45)
Male	3 (4.92)	12 (12.90)	11 (42.31)	11 (55.00)	4 (12.90)	2 (9.10)
Unidentified sex	54 (88.52	80 (86.02)	12 (46.15)	5 (25.00)	24 (77.42)	10 (45.45)

n – number

Due to the fragmentation of skulls and pelvises, we used only the long bones, the proximal tarsal bones (talus, calcaneus), the clavicle and the scapula to estimate sex and adult age (Tables 4 and 5). Most of the skeletal remains were of adult age. In biological sex determination, we determined 12 male femurs and 10 female clavicles as the most numerous, regardless of the side.

3.3 Pathological conditions, nonmetric traits and taphonomic changes of skeletal remains from graves

The skeletal remains found deposited in the graves had several pathologies present, except for the non-adult individual in grave 4 and the individual in grave 9, where only incomplete and fragmented skeletal remains were present. A catalogue of the pathologies, nonmetric traits and taphonomic changes is presented in Table 6. In grave 1, we observed marked inflammatory changes, *i.e.* osteomyelitis, on the left fibula (Figure 3). Bone tissue was disrupted along the entire length of the fibula. Similar incipient inflammatory changes were found on the left tibia at the *margo interosseus* (*crista interossea*) and on the right fibula. On the right fibula, a complete thickening of the diaphysis was also observed. The individual in grave 2 had a prominent callus present in the middle part of the diaphysis of the fibula and tibia, probably caused by a healed fracture. Almost half of the anterior talar articular surface (*facies articularis talaris anterior*) of the calcaneus was missing. The cause may be incorrect development of the calcaneus or antemortem fracture and physiologically incorrect and unnatural walking. Osteophytes and porotic changes were present in the individual from grave 3 (on the distal phalanx of the first finger). Osteophytes were also observed on the skeletal remains from grave 8 (on *alae ossis ilii*, *os ischia*, *tuber ischiadicum*, on the right and left patella). The individual from grave 8 had significant muscle attachments on the left

Figure 3. Inflammatory changes of the fibula sinister in an individual from grave 1. Author: Soňa Kalafutová.

Figure 4. Processus epincondylaris on right humerus of individual in grave 5. Author: Arpád Balogh.

Figure 5. The taphonomic changes (green discoloration) in the skeletal remains in grave 6. Author: Arpád Balogh.

ulna, metacarpal bones, rib fragments and both right and left femur, Schmorl's nodes on the lumbar and thoracic vertebrae and inflammatory changes on one of the ribs. Interestingly, an epicondylar process (*processus epicondylaris*) (Figure 4) was revealed in grave 5 on the right humerus as an anatomical variation. Significant taphonomic changes were observed especially in the female skeletal remains in grave 6 (Figure 5). A green discoloration was present on the upper part of the postcranial skeleton, probably due to the presence of copper fibres in the clothing or burial textile.

Table 6. Catalogue of pathologies, nonmetric traits and taphonomic changes of skeletal remains from the graves.

Grave	Pathological conditions	Nonmetric traits	Taphonomic changes
1	osteomyelitis on the left fibula (marked inflammatory changes); inflammatory changes on the left tibia and on the right fibula at the *margo interosseus*	not observed	not observed
2	prominent callus in the middle part of the diaphysis of the right fibula and tibia; almost half of the anterior talar articular surface of the left calcaneus missing	not observed	not observed
3	osteophytes and porotic changes on the distal phalanx of the first finger	not observed	not observed
4	no pathological changes observed	not observed	not observed
5	no pathological changes observed	epicondylar process on the right humerus	not observed
6	tooth caries on the left M2 on the mandible	not observed	green discoloration on the upper part of the postcranial skeleton
7	no pathological changes observed	not observed	not observed
8	osteophytes on *alae ossis ilii, os ischia, tuber ischiadicum*, on the right and left patella; Schmorl's nodes on the lumbar and thoracic vertebrae; inflammatory changes on one of the ribs	significant muscle attachments on the left ulna, metacarpal bones, rib fragments and both right and left femur	not observed
9	no pathological changes observed	not observed	not observed
10	perforation with the margin clearly demarcated in the area of the anthropometric point of the bregma, circular shape with no visible diploe	not observed	not observed

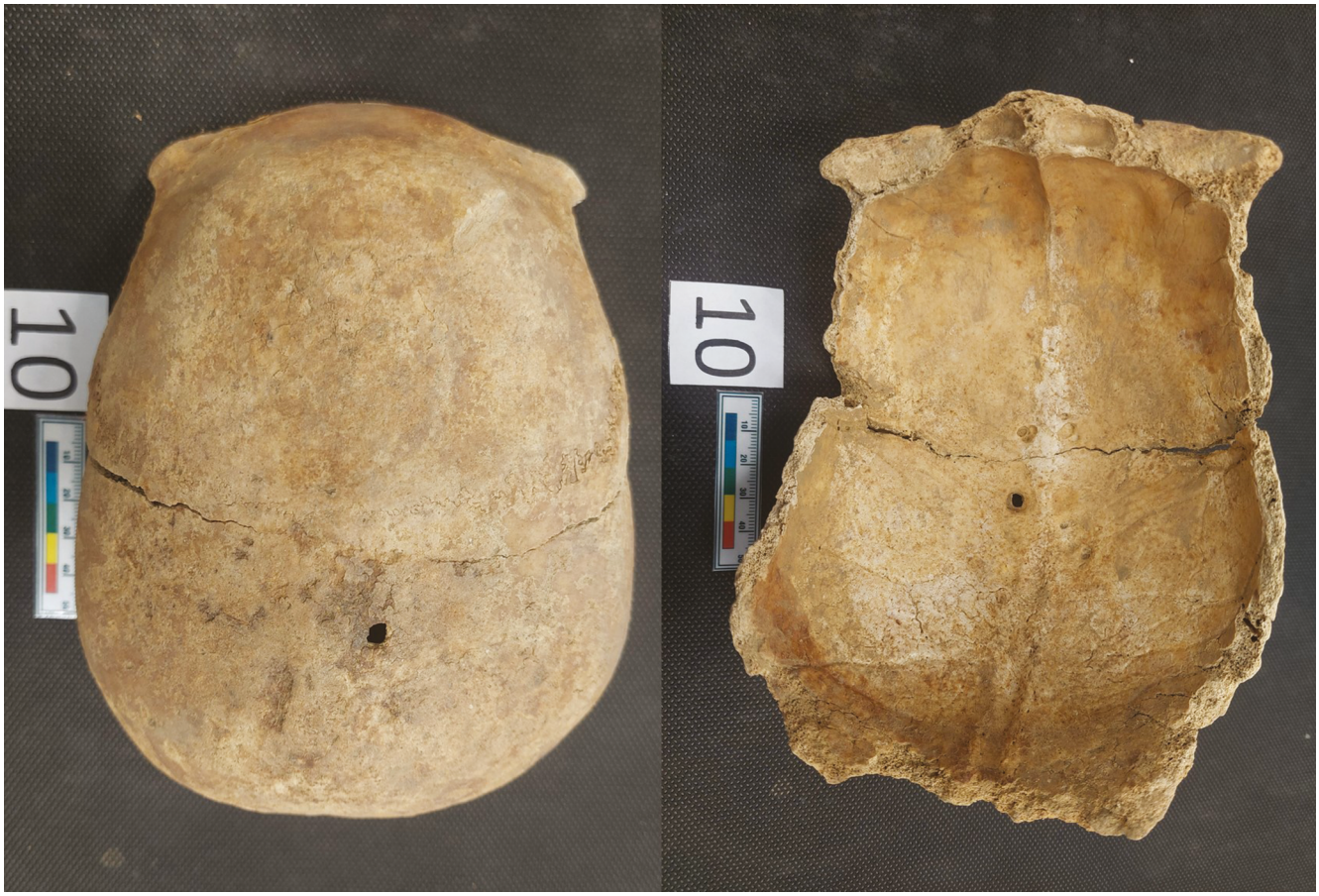

Figure 6. Perforation on the calvarium in the skeletal remains in grave 10. Author: Jana Gaľová.

Only the calvarium was present in grave 10. Approximately in the area of the anthropometric point of the bregma (the junction of the *sutura coronalis* and *sutura sagittalis*) there was a perforation with the margin clearly demarcated (Figure 6). The perforation was of a regular circular shape with no visible diploe. There were also two other circular/oval depressions on the inner aspect of the calvarium.

3.4 Pathological conditions of skeletal remains from surface collection

In the skeletal remains from the surface collection, we observed pathologies such as periostitis, osteomyelitis, osteophytes, Schmorl's nodes, porosity and neoplasms especially on long bones, vertebrae and ribs (Table 7). From the collection of the dental remains, classical oral pathological lesions such as dental caries (25%), antemortem teeth loss (37.5%), and calculus deposits (24%) were encountered.

4. Discussion

Until 1639, the Zápoľský Chapel in Spišský Švrtok belonged to the Lutherans. In this year, the Count Stefan Csáky made a recatholisation step and Catholic services began in the Chapel (Bruckner, 1922). The Minorites (originally *Ordo Fratrum Minorum Conventualium* – OFM Conv.) came to Spišský Štvrtok from Levoča in the middle of the 17th century (in 1668), when the construction of the monastery was probably started by Count František Csáky (Dunčko, 1998). The monastery was consecrated in 1671 and became a place for the preparation and education of future religious members. At the beginning of 1675 fr. Ján Krstiteľ Reggiani performed a census of the population in Spišský Štvrtok. According to him, there were 14 Minorites in the convent in Spišský Štvrtok (Farnosť Spišský Štvrtok, 2017). The Minorites took care of the church of St. Ladislav, as well as of the Zápoľský Chapel, and significantly influenced the religious and cultural life of the village of Spišský Štvrtok until 1950, when the monastery building began to serve as a social services home for women. The Minorites came back to Spišský Štvrtok in 1993 (Dunčko, 1998; Minoriti, 2011). Based on the archaeological dating of the grave sites, it can already be assumed that the burials in the exterior of the chapel occurred during the presence of Minorites at this site (Tajkov and Balogh, 2022). Mainly members of the monastery were buried in the yard of the church. But it is highly probable that the citizens of the village were buried there as well, because the cemetery behind the village in the area named Driža was not founded before the end of the 18th century (Dunčko, 1998). In general, the social status of an individual was reflected in their funeral equipment. Minorites themselves maintained their poverty, which they took as an essential part of life. They personally owned nothing (Minoriti, 2011). According to our research the graves were very poor in artefacts, but it cannot be ruled out that some of the graves were robbed.

The aim of our study was to provide more information about the population whose skeletal remains were found thanks to the archaeological excavation in this area. Based on our anthropometric characteristics of individuals, it is not possible to clearly determine which individuals were buried in this area. Men, women and even children in various age groups were present. Incomplete graves and fragmentary bones complicated the research. It was not possible to determine a complete anthropological characterisation of the individuals in some graves. Further, it was not possible to determine the laterality of some of the bones from the surface collection and therefore to estimate the exact minimum number of individuals (MNI). The minimum number of individuals can be determined by the traditional method according to the study by White (1953), which was also used in our research. The MNI was calculated by dividing the skeletal elements by type and by laterality, and the highest number was used for the final estimate. Other methods for determining MNI are also described. The zonation method developed by Knüsel and Outram (2004) is based on zooarchaeological methods and divides skeletal fragments based on morphological zones. These are the diagnostic zones described by Watson (1979), which are species-specific in their morphology, present on both aggraded and ungraded specimens, with no age variation, and rarely disrupted; 3 to 15 zones per bone can be identified and their presence or absence is recorded. The MNE (minimum number of elements) is determined as the most represented zone on the skeletal element, regardless of side (Osterholtz *et al.*, 2014). Then it is possible to determine

Table 7. Pathologic changes on bones from the surface collection.

	Humerus n (%)	Femur n (%)	Tibia n (%)	Fibula n (%)	Ribs n (%)	Vertebrae n (%)
Periostitis	–	14 (15.05)	25 (32.05)	5 (17.24)	–	–
Schmorl's nodes	–	–	–	–	–	2 (2.25)
Osteophytes	–	–	–	–	–	9 (10.11)
Osteomyelitis	1 (1.64)	2 (2.15)	2 (2.56)	–	–	–
Porosity	4 (6.55)	13 (13.98)	8 (10.25)	–	1 (0.64)	13 (14.6)
Neoplasms	6 (9.83)	–	5 (6.41)	5 (17.24)	12 (7.74)	–

n – number

MNI as the highest MNE per skeletal element from one side with respect to adult and subadult remains (Knüsel and Outram, 2004; Lambacher *et al.*, 2016). Another method to determine MNI is to observe osteological landmarks that are consistently present on bone in all individuals – such as tubercles, foramina, articular surfaces or bone processes. All landmarks were scored as present or absent (1 or 0) and are only used for final MNI estimation if >50% of the landmark was observed (Mack *et al.*, 2015).

Analysis of the pathological conditions of individuals that may have affected the length and quality of their lives is included in every anthropological study. We monitored the health status of individuals in ten graves and on skeletal remains from the surface collection. Of note is the marked osteomyelitis observed in the man in grave 1, which was probably caused by a bacterial infection although a fungal pathogen cannot be ruled out. In adult individuals, osteomyelitis is most commonly caused by the organism *Staphylococcus aureus* (Lew and Walvogel, 1997). However, other Gram-positive cocci (*e.g. Streptococcus spp*.), Gram-negative rods, and anaerobic organisms are also frequently isolated. The focus of bacterial seeding in this process is considered to be trauma, trivial skin infection, hematogenous spread or contiguous focus when it originates from an infection in a nearby tissue (Calhoun *et al.*, 2009; Parvizi, 2010). A special pathological analysis of skeletal remains of grave 1 could more accurately determine the type of osteomyelitis.

A differential diagnosis will be made on the individual from grave 10, where only the calvarium was present with a visible perforation approximately in the area of the bregma and two other circular/oval depressions on the inner side of the calvarium. The hypothesis is that the above change was caused by pacchionian (or arachnoid) granulations, which produce thinning of the overlying calvarium. Usually only the inner table and diploe are affected, but sometimes the outer table is also eroded (Kaufman *et al.*, 1997). We also cannot exclude bacterial disease, specifically calvarium tuberculosis, which especially causes destruction of the inner table frontal and parietal bones as a common site of involvement (Raut *et al.*, 2004).

Of the inflammatory bone diseases, periostitis was also observed on skeletal remains from the surface collection. It was present on the femur (15.05%), tibia (32.05%) and fibula (17.24%). The presence of periostitis has been reported worldwide as an important health marker of skeletons from archaeologically investigated burial sites and an important indicator of the response to various stresses (Kim *et al.*, 2013). Periostitis is an inflammation of the periosteum or fascia that surrounds the bone (Hochberg *et al.*, 2011), which is manifested by thickening and bone remodelling (Kini and Nandeesh, 2012). It can be caused by excessive physical activity or by specific infections (*e.g.* syphilis). Its prevalence increased as economic and/or societal conditions worsened (Ortner, 2003).

Of interest in our study was the *processus epicondylaris* (epicondylar process) on the right humerus in the male individual in grave 5. It is a bony prominence situated on the antero-medial surface of the humerus proximal to the medial epicondyle (Natsis, 2008). The incidence of epicondylar processes ranges from 0.1% to 2.7% in the human population (Gupta and Mehta, 2008). The presence of *processus epicondylaris* is usually asymptomatic. It becomes clinically significant when it is associated with the Struthers ligament. The Struthers ligament was described as a fibrous band that extends from a bone spur located on the anteromedial surface of the lower third of the humerus (Caetano *et al.*, 2017). It is rare aponeurotic structure caused by the compression of the median nerve (pronator teres syndrome) and claudication of the brachial artery in humans (Subasi *et al.*, 2002; Shivaleela *et al.*, 2014). This manifests along with parasthesia and ischemic pain in the forearm and hand (May-Miller *et al.*, 2019). *Processus epicondylaris* could have had health consequences such as pain, discomfort, numbness or tingling or muscle weakness, especially with physical stress and strain on the humerus in the young adult man from grave 5, but there is no evidence to confirm it.

The subject of our study was also the investigation of taphonomic changes that were mainly observed on the skeletal remains in grave 6. A female individual had green staining on several bones in the upper part of the postcranial skeleton. Taphonomy studies the natural and cultural processes that affect the organic remains of individuals and change their appearance (Shipman, 1981). Skeletal remains are subject to diagenetic processes, including discoloration. The most commonly encountered stains on bones are from soil, organic materials, or metals (Cheney, 2021). The corrosion of metal in contact with bone results in metal staining and possibly adhering corrosion products to the bone (Schultz, 2012). Staining on bone from metals can be caused by numerous circumstances wherein various types of metal from clothing, burial textiles, jewellery or other personal artifacts, wreaths and metal parts of a coffin come into contact with the skeletal remains (Buikstra and Ubelaker, 1994; Cheney, 2021; Lipkin *et al.* 2021). Green to green-blue discoloration on skeletal remains is caused by copper and copper alloys (such as bronze and brass) (Buikstra and Ubelaker, 1994). Copper staining could be present on bone as a result of copper alloy-based clothing artifacts such as buttons and pins (Dupras and Schultz, 2013). Metal threads were used to decorate textiles and were primarily made of gold, silver and copper, either alone or combined (Karatzani *et al.*, 2021). Copper was the main element in metal threads from folk costumes and liturgical vestments (Šimić *et al.*, 2022). The individual from grave 6 may have been wearing a burial textile that was decorated with copper threads.

Overall, the anthropological analysis of the skeletal remains from the Zápoľský Chapel provides a comprehensive understanding of the demographic characteristics, pathologies, and taphonomic changes of the population in Spišský Štvrtok during the 17th–18th century. These findings contribute to our knowledge of the health conditions, lifestyle factors, and burial practices of this historical community.

Further research and interdisciplinary collaboration can enhance our understanding of the social and historical context surrounding these skeletal remains.

5. Conclusion

During the renovation of the Zápoľský Chapel, human skeletal remains were uncovered from its exterior. The collection represented 10 graves and 1024 fragments of surface collection. After analysing the surface collection, we determined the presence of a minimum of 35 individuals according to the maximum number of right femurs. The age-at-death profile indicates that most of them were adults. In monitoring the health status of the individuals, pathological changes were observed on the skull, teeth, as well as on the postcranial skeleton. Osteomyelitis, periostitis, neoplasms, dental pathologies were present. No bone fractures were observed. An interesting finding was a rare anatomical variation, *processus epicondylaris*, in an individual in grave 5. The extensive taphonomic changes on the skeletal remains in grave 6 were remarkable, probably caused by burial textiles containing copper threads. The artifacts present in the graves date the burial of the excavated individuals to the 17th–18th century. These centuries are related to the period when the monastic order of Minorites took care of the church and the chapel. Therefore, it is highly probable that many of the individuals whose skeletal remains have been found were members of this order. However, the fact is that the origin of the exhumed skeletal remains from the area of Zápoľský Chapel is still unknown and it will be a subject of further deep discussion.

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