A possible case of Gigantism and/or Acromegaly in a 15th-17th century woman from Đurine ćelije, Serbia

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Abstract

Endocrine disorders during growth and development that occur due to the secretion of excessive growth hormones are very rare in archaeological and modern populations. The human skeletal remains analyzed in this paper belong to an unusually tall woman, approximately 35-40 years of age, buried at the Đurine ćelije site (15th-17th century) in Serbia, who may have suffered from overgrowth syndrome. Individuals with this condition have an unusually tall stature and accompanying pathological changes related to organ systems and joint diseases. The aim of this paper is to show how the aforementioned disorder affected the health status of an individual (grave No. 7a) and the performance of daily activities, but also the attitude of the community towards deformities during life and after death. Differential diagnosis was performed since other diseases tend to lead to similar skeletal changes. During the analysis, changes in growth were noticed, and her stature was determined to be 186.42 cm. Compared to the documented stature of post-medieval population from this period, the skeletal remains show a significant deviation from the average, especially when it comes to female individuals. Other pathological changes observed in this woman are osteoarthritis, spondyloarthropathy, and periosteal new bone formation.

Introduction

The human skeletal remains analysed in this paper belong to an unusually tall individual buried at the Đurine ćelije site (15th-17th century) (Figure 1a, b), who may have suffered from overgrowth syndrome. The most common etiology of this syndrome is related to pituitary dysfunction that produces excessive amounts of somatropin or growth hormone. In most cases, growth disorders occur due to pituitary adenoma (benign tumor) or pituitary tissue hyperplasia (Aufderheide and Rodríguez-Martín, 1998; Ђурић-Срејић, 1995; Ortner and Putschar, 1981). Excessive secretion of this hormone leads to excessively tall stature and is a serious obstacle to the normal physical development of the individual. If this disorder occurs before the fusion of the growth plate, then the

condition is called gigantism, if growth is complete before the tumor develops, then it is known as acromegaly (Atanacković, 1990; Roberts and Manchester, 2010). However, when excessive secretion of growth hormone occurs in childhood and continues through adulthood, the result is the simultaneous development of both disorders related to acromegaly and gigantism (Ortner, 2003). Such disorders are rare in ancient people, as well as in modern populations, with the higher occurrence of acromegaly in modern society. Today's statistics show that acromegaly occurs in 3: 1,000,000 cases annually worldwide, with a higher incidence in women than in men (Extabe, et al. 1993), while gigantism is less common, around 100 cases have been documented in the literature so far, although this certainly does not correspond to the real data and this number is probably underestimated (Sotos, 1996).

Figure 1a: Map of the Republic of Serbia showing the geographical location of the Đurine ćelije site

Figure 1b: Geographical position of the Republic of Serbia in a map of Europe

Excessive secretion of growth hormone in people younger than 10 years, suffering from gigantism, leads to accelerated linear growth. Body proportions are normal if the balance of linear growth is established by uniform fusion of the epiphyseal plate, however, uneven fusion can also occur, resulting in asymmetric body proportions (Aufderheide and Rodríguez-Martín 1998). In this condition, additionally to the excessively tall stature, the length and diameter of long bones are also increased (Ortner and Putschar 1981). If the main cause of this condition was a tumor then the sella turcica is enlarged (Weisberg et al. 1976). In acromegaly, the most noticeable changes are visible on the facial bones leading to a general enlargement, as well as an enlargement of the paranasal sinus, and the bones of the skull vault are thickened. The lower jaw is elongated and prognathism and dental malocclusion occur. In the bones of the skull vault, changes leading to a robust appearance are evident, the superciliary

arches are prominent on the frontal bone, and the external occipital protuberance of the occipital bone is pronounced (Ortner and Putschar, 1981; Ortner, 2003). On the postcranial skeleton, the bones of the hand and foot as well as the vertebrae are enlarged and the ribs are broad (Aufderheide and Rodríguez-Martín, 1998; Waldron 2009). The pathological changes that accompany these endocrine disorders are related to organ systems and joint diseases. In ancient and modern skeletons, in addition to degenerative changes, spondyloarthropathies lead to difficulties of breathing and moving, and signs of infectious diseases are often detected. Altogether, along with other pathologies, this will shorten the life of the individual (Ortner and Putschar, 1981; Chanson and Salenave, 2008).

According to the paleopathological literature, a modest number of certain and potential cases of gigantism and acromegaly in ancient people have been documented (Table 1). The commonality linking all these individuals is primarily extremely tall stature, long bones of the upper and lower extremities, robust and thickened skull, large and protruding lower jaw, enlarged sella turcica, numerous pathologies that accompany this condition and a short lifespan that rarely exceeds 30 years of age.

Table 1 Certain and probable cases of gigantism and acromegaly in ancient people that have been documented

Site	Sex and age	Stature (cm)	Endocrine disorder	Pathology	Source
Pržine, Gacko (14th-15th century), Bosnia and Herzegovina	M, 30	173	Acromegaly	Mandible shaped like "antique lamp", hyperplasia and hypertrophy cranial, extensions of paranasal cavities, longitudinal growth of femurs	Hošovski, 1991
Monte Bibele (4th-2nd century BC), Italy	M, 18-20	-	Possible gigantism with acromegalic features	Bones are hypertrophic, especially the facial bones and the clavicle, mandible and the skull are thickened, the epiphyses are very broadened.	Brasili et al., 1997
Ostrow Lednicki (12th-13th century) Poland	F, 23-30	215.5	Gigantism and acromegaly	Excessive body height, enlargement of bones, disproportionately large mandible, enlarged sella turcica	Gladykowska-Rzeczycka et al., 1998
Giza (5th dynasty; 2494–2345 BC), Egypt	M, 20-30	192.4	Possible gigantism	Tall and proportional stature, delayed epiphyseal union, enlarged sella turcica, biparietal thining	Mulhern, 2005
Bonn Square (11th-19th century), England	M, Adult	-	Possible acromegaly	Disproportionately large mandible	Webb and Norton, 2009
Eleutherna (7th century), Greece	?, 25-40	-	Acromegaly	Thickened skull, bone reliefs were robust, enlarged sella turcica	Charlier and Tsiganoki, 2011
Torre Serpentana (3rd century), Italy	M, 18-20	202	Gigantism	Very tall stature and long bones, possible enlargement of the sella turcica, nonuniformity or delayed epiphyseal closure	Minozzi et al. 2012; Minozzi et al. 2013
Blossom Mound (4350-3000 BP), Central California	M, 30-40	-	Possible acromegaly	Pronounced bone reliefs of the skull, crowding and malocclusion of the anterior dentition, enlargement of sella turcica	Bartelink et al., 2013
Ronda Sur (8th-9th century), Spain	M, 22.22–33.74	-	Possible gigantism/acromegaly	Large and thick neurocranium and pronounced bone reliefs, large and massive mandible, enlargement of the vertebral bodies, thickened ribs, slight increased length of the diaphysis with an increased cortical bone thickness of lower limbs	Viciano et al., 2015
Tasmasor (post-medieval period), Turkey	Young adult	188.9	Gigantism and acromegaly	Excessive bone growth in length and width, enlarged sella turcica, biparietal thinning, prognathism, facial robustness, elongated and enlarged ribs, widened metatarsals and metacarpals	Özdemir et al., 2017

Therefore, the aim of this paper is to show how the aforementioned disorders affected the health status of an individual found at Đurine ćelije site (grave No. 7a) and the performance of daily activities, but also the attitude of the community towards deformities in the life of the person and after death. Also, based on the detected pathological changes on the cranial and postcranial skeleton, which may indicate the presence of other diseases, differential diagnosis was performed here.

Materials and methods

The skeletal remains analyzed in this paper come from the post-medieval site of Đurine ćelije in the area of Rudnik, Serbia (Figure 2). Continuous archaeological excavations of this site took place between 2013-2016 (Радичевић и Миливојевић, 2013; Радичевић и др., 2015; Гордић и Ћирковић, 2018). During that time, the remains of a monastery complex with a necropolis were discovered.
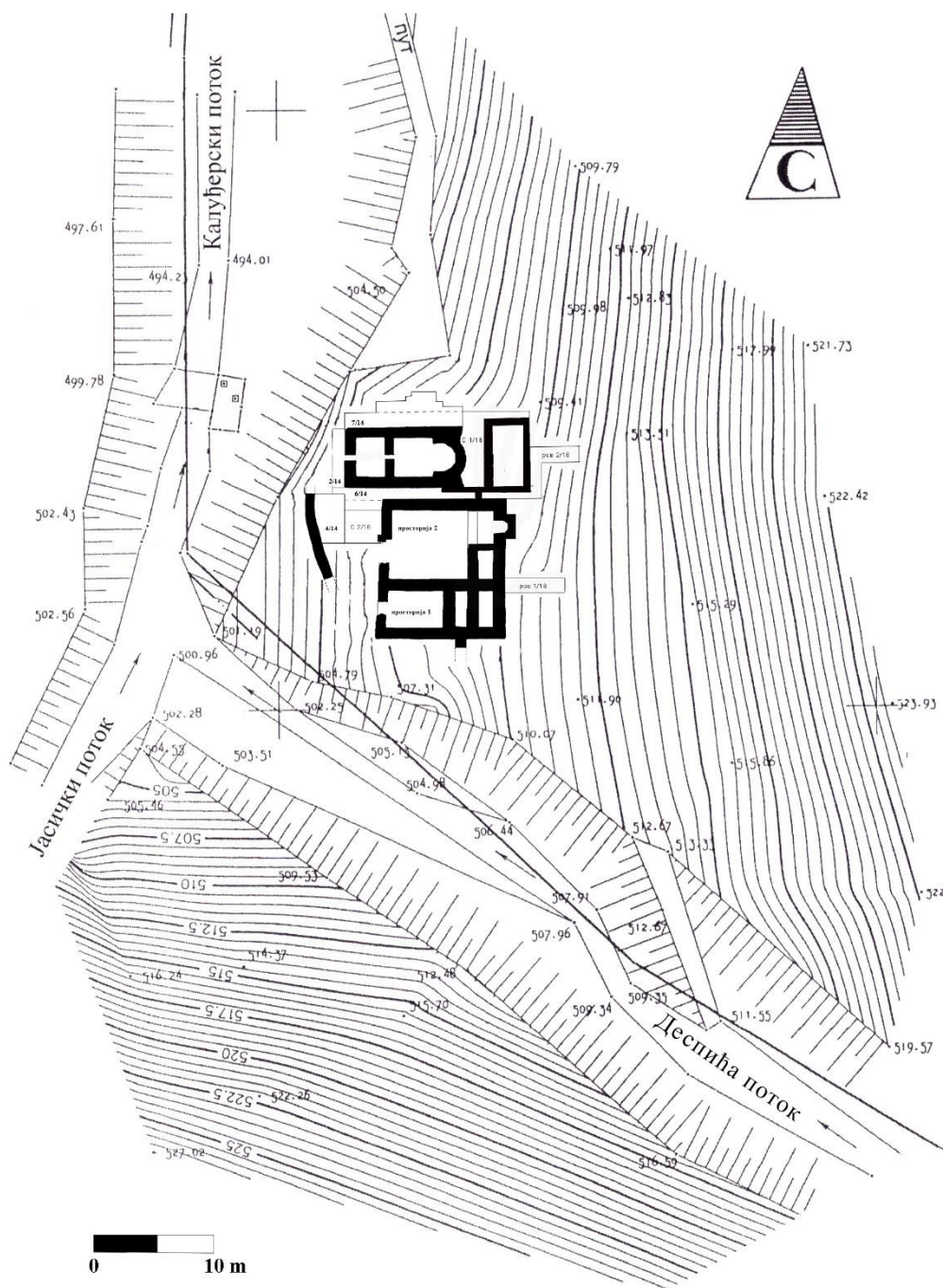
Figure 2: Site plan of Ђurine ćelije site (from Радичевић и др. 2016)

The deceased were buried in the immediate vicinity of the monastery church. Several horizons of the use of the necropolis have been recorded, dated to the period from the 15th to the 17th century on the basis of archaeological findings. According to the tombstone inscription of grave No. 6 which testifies to the burial of Jovan Sipahi[1], archaeological finds from the same grave and a coin found in grave No. 8, it was possible to date

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[1] The Sipahis were horsemen in the Ottoman army and could own a timar (land). They had a high social status among Serbs during the Ottoman Empire (Радичевић и Миливојевић, 2016).

only the youngest burials from the 17th century. Archaeological excavations have revealed 25 graves (Радичевић и Миливојевић, 2013; Радичевић и др., 2015; Гордић и Ћирковић, 2018). The deceased were buried in an extended position on their backs, usually with their hands on their chests or stomachs, orientation west-east (Радичевић и др., 2015). There were some deviations and the orientationthe orientation of some burials was northwest-southeast (Гордић и Ћирковић 2018). North of the church, burials were located under the tombstones (Figure 3) and they are dated to the 17th century (Радичевић и др., 2015). Below one of the tombstones, marked as grave No. 7 there were two buried individuals. The first buried deceased (7b) was in the primary position, while the skeletal remains of the second buried individual (7a)

were disturbed, i.e. in the secondary position (Figure 4). According to the researchers of this site, the grave was disturbed before archaeological excavations took place.[2]

The state of preservation of skeletal remains was observed according to the categories proposed by Mikić (Mikić 1978). Determination of the sex was based on the morphological characteristics of the pelvic bones, as well as the morphological characteristics of the skull (Workshop of European Anthropologists, 1980; Buikstra and Ubelaker, 1994). The auricular surface of the ilium (Lovejoy et al., 1985b) and the degree of closure of the cranial sutures were observed to determine age at the time of death (Workshop of European Anthropologists, 1980). The standard tooth numbering system was used in the analysis of dentition (Federation Dentaire

Figure 3: Tombstones north of the monastery church (from Радичевић и др. 2016)

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[2] Ђурине ћелије-report 2015, December 15th 2015.

Figure 4: Grave No. 7 with two buried individuals (photo credit: V. Milivojević)

Internationale, 1971). Metric analyzes were applied in this paper to obtain data on stature based on maximum length of long bones, according to the formulae of Trotter and Gleser (1958) and body weight was calculated based on the maximum diameter of the femoral head, according to the formula of Ruff et al. (1991). Existing standards (Ortner and Putschar, 1981; Aufderheide and Rodríguez-Martín, 1998; Ortner, 2003) were used to identify and diagnose pathological changes. In this paper, the analysis of macroscopic examination of musculoskeletal stress markers was also performed (Mariotti et al., 2017).

Results

The analyzed human skeletal remains in this paper belong to the category of well – preserved, incomplete skeletal remains. In Figure 5 the state of preservation of skeletal remains is presented. Table 2 provides the skeletal measurements buried in grave No. 7a. Morphological characteristics of the skull (*os frontale, arcus superciliaris, tuber frontale et parietale, planum nuchale*, total aspect of the mandible, *mentum, angulus mandible*) and postcranial skeleton (*incisura ischiadica major*) showed that the skeletal remains belong to a female individual. Her age at the time of death, based on morphological changes of the auricular surface of the ilium, was 35-39 years (stage IV), and based on the degree of closure of the cranial sutures from 35-40
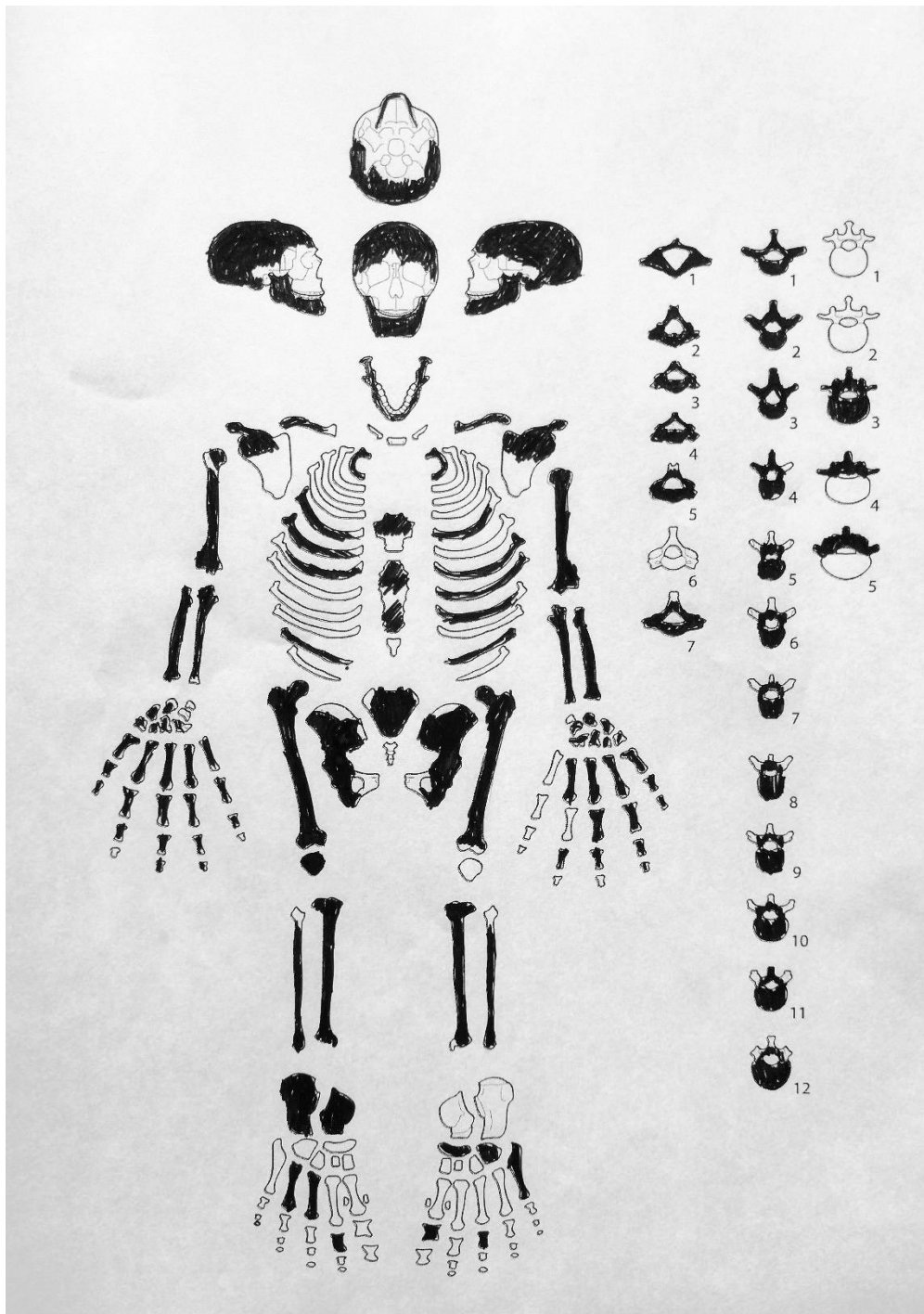
Figure 5: Inventory of burial No. 7a. Bones shaded in black are present.

years of age.[3] According to the method of Trotter and Gleser (1958), the maximum lengths of long bones were measured and her body height was calculated (Table 3). Stature values ranged from 189.93 cm for the right tibia and 182.92 cm for the right femur, with an average value of 186.42 cm. According to the formula of Ruff et al. (1991) her body weight was 80.9 kg.

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[3] Although cranial suture closure is used for decades as an indicator of age it is an unreliable method. Diseases or genetic disorders can lead to faster or slower suture closure.

Table 2 Measurements of the cranial and postcranial skeleton

Grave No. 7a			
Cranial osteometric data (cm)		a-p diameter at midshaft	1 1
Mandible		m-l diameter at midshaft	1.3 1.4
Height of the mandibular body	2.4	**Ulna (cm)**	
Breadth of the mandibular body	1.1	Maximum length	30.9 -
Bigonial width (go-go)	8.7	a-p diameter	1 1.2
Bicondylar breadth (cdl-cdl)	10.9	m-l diameter	1.2 1.3
Minimum ramus breadth	3.5	Physiological length	27.5
Maximum ramus breadth	4.2	Minimum circumference	2.9
Maximum ramus height	7.5	**Femur (cm)**	
Mandibular length	8.2	Maximum length	- 50.6
Postcranial osteometric data		a-p subtrochanteric midshaft	2.3 2.4
Humerus (cm)		m-l diameter subtrochanteric midshaft	2.1 2.2
Maximum length	35 -	Maximum head diameter	- 4.8
Maximum diameter at midshaft	2.4 2.5	Midshaft circumference	9.2 9.4
Minimum diameter middle	2 2,1	**Tibia (cm)**	
Epicondylar breadth	6.5 6.7	Length	44.3 -
Clavicule (cm)		Maximum diameter at the nutrient foramen	2.7 2.5
Maximum length	15.5 -	m-l diameter at the nutrient foramen	2.1 2
Sagittal diameter at the midshaft	4.2 4.1	Circumference at the nutrient foramen	9.7 9.4
Radius (cm)		**Fibula (cm)**	
Maximum length	28,5 28.6	Maximum diameter at the midshaft	2.2 2

Bones marked with * have two measurements, the upper is for the left, and the lower is for the right side of the body

Table 3 Measurements of the long bones and estimated stature (grave No. 7a)

Long bones	Maximum length (cm) Left	Maximum length (cm) Right	Stature (cm) Left	Stature (cm) Right
Humerus	35	-	179. 25 ± 4	-
Ulna	30.9	-	188. 95 ± 4	-
Radius	28.5	28.6	187. 43 ± 4	187. 81 ± 4
Femur	-	50.6	182. 92 ± 4	-
Tibia	-	44.3	189. 93 ± 4	-

Table 4 presents an overview of estimated stature of medieval populations on the territory of Serbia during the late Middle Ages. The range of estimated stature for men ranged from 153-181 cm, and for women from 146-172 cm (Живановић, 1985; Живановић, 1987; Ђурић-Срејић, 1997; Миладиновић-Радмиловић, 2007; Вуловић и Бизјак, 2019). At the Ђурине ћелије site, the average stature for males was 179.19 cm, and for

Table 4 Estimated stature for late Medieval population from Serbian sites. ([a]M-9, F-2; [b]M-25, F-10; [c]M-9, F-13; [d]M-32, F-24; [e]M-4, F-0; [f]M-5; F-0).

Site	Stature (cm)			
	Male-average value	Range	Female-average value	Range
Đurine ćelije (15th-17th century) [a, 1]	179, 19	165, 04-192, 25	165, 32	165, 17-165, 46
Deževo (14th-15th century) [b, 2]	168, 36	158, 39-175, 69	162, 60	152, 59-172, 38
Valjevska Gračanica (15th-19th century) [c, 2]	169, 3	161-172	159, 2	158, 8-164
Crkva 4 (Trgovište) (15th-17th century) [d, 2]	166, 97	153, 75-181, 07	155, 67	146, 51-163, 09
Manastir Resava (15th century) [e, 1]	174, 5	168-178	-	-
Madžarsko brdo (late middle ages) [f, 1]	175	170-181	-	-

[a-f] Number of male (M) and female (F) individuals

[1] Authors used formula of Trotter and Gleser (1952)

[2] Authors used formula of Pearson (1899)

females 165.32 cm[4]. In individual No. 7a estimated stature was 20 cm higher than the average height of females. This is most evident in this case, abnormal height and proportional growth, significantly long bones of the upper and lower extremities (Figure 6) and pathological changes in the cranial and postcranial skeleton. Robust characteristics were noticed on the skull, a pronounced external occipital protuberance and large mastoid process. Prognathism-protrusion and obtuse angle are noticeable on the mandible (Figure 7a) and a significant number of teeth lost antemortem[5] (Figure 7b).

Anatomical variation such as bilateral perforatio fossa olecrani, also known as septal aperture, was detected on both humeri (Figure 8). The pathological changes

Figure 6: Comparison of the long bones of the lower limbs between 7a and normal body height of the female individual (grave No. 6) (photo credit: author)

[4] It was possible to calculate stature only for three women. However, the individual from grave No 7a was excluded from this analysis due to growth disorder (Miljević, 2018).

[5] FDI numbering system for the permanent teeth: Teeth lost antemortem: 37, 38, 44, 46-48.

Figure 7a: Protrusion and obtuse angle on the mandible (photo: author)

Figure 7b: Teeth lost antemortem (photo: author)

observed in this individual are: osteoarthritis, spondyloarthropathy, and periostitis. Osteoarthritis has been observed in almost every joint, most often in the form of osteophytes and eburnation. The new bone formation or osteophytes were found on the proximal ends of the left and right humerus, radius, femur, tibia and preserved distal ends of fibulae, on the distal ends of clavicles, metatarsal, and tarsal bones. On the right clavicle and acromion of the right scapula, in addition to osteophytes, eburnation also occurs (Figure 9). Fusion of the right rib with the vertebra was observed on one thoracic vertebra (T4) (Figure 10). Traces of fusion are also noticeable in other thoracic vertebrae, but during

the excavation it was separated. Fusion also occurs in the area of the spinous process, i.e. in the articular surfaces of the lumbar vertebrae (from L3 to L5) and thoracic vertebrae (from T9 to T12) with the intervertebral space between the bodies of the thoracic vertebrae (Figure 11). Significant curvature and sacralization with L5 was observed in the sacrum. The missing sacroiliac joint probably existed and was lost

Figure 8: Bilateral epigenetic variation perforatio fossa olecrani on the distal ends of both humerus (photo credit: author)

Figure 9: Osteoarthritic changes (eburnation) on the acromion of right scapula (photo credit: author)

Figure 10: Costovertebral joint on the thoracic vertebrae (T4) (photo credit: author)

during or after excavation. Excessive bone growth on the remaining parts of the left pelvic and sacral bone parts indicate an ossification, probably an ankylosing spondylitis. Periosteal reactions occur on almost all long bones of the upper and lower extremities (humerus, femur, tibia, fibula). These are healed periosteal reactions, none of which were active at the time of death. In the left femur, due to this disorder, there was never an adhesion of the proximal end (femoral head) with the diaphysis (Figure 12), although ossification on all bones showed that the growth was complete.

Figure 12: Nonunion of the proximal epiphysis with diaphysis of the left femur (photo credit: author)

Bilateral indentations on the lateral sides of both proximal femurs were observed (Figure 13), as well as narrowing of the iliac bone on the left preserved pelvic

Figure 11: Fusion of articular surface of thoracic and lumbar vertebrae (photo credit: author)

Figure 13: Bilateral indentations on the lateral sides of both proximal femurs (photo credit: author)

bone. Musculoskeletal stress markers were observed on the postcranial skeleton, and the most pronounced muscle attachments were present on the right side of the skeleton (Table 5).

Table 5 Degree of musculoskeletal stress markers on the upper and lower limb bones (grave No. 7a)

	Muscle attachments
Humerus	m. deltoideus
Right	2
Left	1c
Humerus	m.brachioradialis
Right	3
Left	2
Radius	m. biceps brachii
Right	2
Left	1c
Ulna	m .brachialis
Right	3
Left	2
Femur	m.gluteus maximus
Right	2
Left	2
Patella	quadriceps tendon
Right	3
Tibia	m.soleus
Right	3
Left	2
Tibia	quadriceps tendon
Right	2
Left	2

Discussion and Conclusion

Discussion

Growth and development disorders that lead to tall stature rarely occur in archaeological and modern populations, and they are especially difficult to diagnose on osteological material. However, if abnormal stature is not associated only with excessive secretion of growth hormone from the pituitary gland, these changes can also occur due to other similar disorders. Diseases that lead to similar development and growth disorders are Marfan's syndrome (Petitt and Adamec, 2005; Aufderheide and Rodríguez-Martín, 1998), Sotos syndrome (Parker and Parker, 2007), Weaver syndrome (Bansal and Bansal, 2009) and Beckwith-Wiedemann syndrome (DeBaun and Horst, 2011). Marfan's syndrome is a genetic disorder that affects the cardiovascular, ocular and skeletal systems (Petitt and Adamec, 2005). The skeletal changes that dominate due to Marfan's syndrome are excessively long upper and lower extremities, especially the upper ones. In addition, dental anomalies and malocclusion occur, scoliosis, kyphosis or pectus carinatum (pigeon breast) are common in the area of the chest and spine (Aufderheide and Rodríguez-Martín, 1998). Sotos syndrome is another disorder that affects the skeletal system and where growth is accelerated. Affected babies and children tend to grow faster and they are taller than children of the same age. However, their

adult height is quite normal. An abnormal curvature of the spine (scoliosis) can also be the sign of Sotos syndrome (Parker and Parker, 2007). Weaver syndrome is a disorder that usually starts with rapid growth before birth of the baby and continues through childhood. It is characterized by accelerated bone maturation, craniofacial, skeletal and neurological abnormalities. The mandibule can be smaller than normal. Fingers of people affected with this syndrome are usually broad (Bansal and Bansal, 2009). Beckwith-Wiedemann syndrome is an overgrowth syndrome of the prenatal period and it is characterized by congenital malformations, and predisposition to cancer. Children with this syndrome can have asymmetry of the limbs or face, as well as joint laxity, scoliosis, and thoracic cage abnormalities (DeBaun and Horst, 2011).

Despite the differential diagnosis, where none of the above examples completely fit into the presented pathological picture, and the insufficient preservation of skeletal remains (especially facial bones and sella turcica), which would facilitate and confirm the diagnosis that this is an overgrowth syndrome due to pituitary adenoma, we can only assume that the observed changes in the osteological material may have been due to excessive secretion of this hormone. The results of the anthropological analysis which may indicate that the individual from grave No. 7a was suffering from gigantism and / or acromegaly are as follows:

1. The appearance of the skull which has robust characteristics, as indicated by the prominent external occipital protuberance, large mastoid processus. Protrusion-prognathism and obtuse angle of the mandible were observed on the mandible.

2. On the postcranial skeleton, increased longitudinal growth of the upper and lower extremities, nonunion of the proximal epiphysis with the diaphysis of the left, abnormal stature for period and sex and accompanying pathologies (degenerative joint diseases, spondyloarthropathy of the spine, periosteal changes on the long bones) were detected.

Although the skull has robust characteristics, morphological changes of the pelvis indicate a female individual. Mandibular prognathism occurs in these

disorders leading to remodeling of bites, malocclusions, and large numbers of teeth lost antemortem (Aufderheide and Rodríguez-Martín, 1998; Ortner, 2003). Incomplete fusion of the proximal end with the diaphysis occurs in younger individuals who have been diagnosed with gigantism, because this disease leads to growth disorder (Waldron, 2009). However, in this individual (grave No. 7a) the growth on all the bones was complete, so we cannot speak of a younger person. It is obvious that the excessive secretion of growth hormone that developed in youth continued in adulthood, which could have resulted in both gigantism and acromegaly. This is also indicated by her tall stature (186.42 cm), which stopped at one point. If the increased secretion of hormones continued in youth (before the complete fusion of the pineal gland), this individual would certainly have a height of over 200 cm (Aufderheide and Rodriguez-Martin 1998). Pathologies observed in No. 7a belong to the group of pathologies that are standardly associated with constant excessive growth disorder (Aufderheide and Rodriguez-Martin, 1998; Hošovski, 1991; Mulhern, 2005; Ozdemir et al., 2017). Patients with gigantism rarely or never live longer than 30 years, because of the progression of other diseases (Minozzi et al., 2012), while in patients diagnosed with acromegaly life expectancy exceeds 50 years of age (de Herder, 2008; de Herder, 2014). Possible ankylosing spondylitis in No. 7a was detected in the form of fusion which affected the lumbar and thoracic vertebrae in the area of the spinous process and joint surfaces, as well as the costovertebral joints on the thoracic vertebrae. The sacroiliac joint also existed, but during or after the excavation, this joint was damaged and separated. According to Olivieri et al. (2009), Waldron (2009) and Ortner and Putschar (1981) the disease usually begins in the lumbar vertebrae and sacroiliac joint and progressively affects the thoracic vertebrae and their costovertebral joints. Also, for a full list of diagnostic criteria follow up Šlaus et al. (2012). Perforatio fossa olecrani, which is observed on the distal ends of the humeri, may be related to this disorder. It has been observed that this epigenetic anomaly occurs with a higher frequency in the female population (Mays, 2008). The hypothesis is that weaker muscles can lead to increased joint looseness, which results in hypermobility and the appearance of

perforatio fossa olecrani, and that it occurs in a higher percentage in older individuals. There have been attempts to compare the incidence of osteoarthritis with this anomaly (Myszka and Trzcinski, 2015; Myszka, 2015), but it has been concluded that it develops in youth and not as osteoarthritis in old age. The question of the cause of this anomaly remains open. In addition to the observed pathological changes, changes in the form of indentations on the lateral sides of both femurs were recorded, as well as narrowing of the iliac bone of the left pelvic wing. It was not possible to observe the right one because it was fragmented.

This case showed that, despite the aggravated pathological picture and indisputably different physical appearance and development, she was not separated and isolated from other graves, but received the same treatment in funeral practice as all the deceased, including burial below the tombstone. Although this is not an isolated example, it is known from previous research that the caring attitude of the society towards deformities and weaknesses of people with gigantism and acromegaly did not always extend to posthumous customs (Gladykowska-Rzeczycka et al., 1998). The analysis of the skeletal remains of a giant woman from the Ostrow Lednicki site showed that, once or probably several times, she received medical care throughout her life during the repair of the limb fracture. However, during the mortuary treatment, she was not buried in the same necropolis as the others, but in another former necropolis that ceased to be used, but was previously reserved for the burial of the elite. Also, she was not buried in the same position. Her body was placed in an unusual position and out of order. Her skeleton was lying on the left side, with her left hand close to her head. The right upper limb was bent at the elbow, the left lower limb was bent at the knee, and apparently without care. This does not mean that the woman from Ostrow Lednicki was completely rejected, but in the contrast to the case presented in this paper from Đurine ćelije, she was probaly not a full member of the community (Gladykowska-Rzeczycka et al., 1998; Matczak and Kozlowski, 2017).

Conclusion

Abnormally enlarged long bones of the upper and lower extremities, robust skull, mandibular prognathism, numerous pathologies and tall stature above the average for the post-medieval population and sex were recorded in a female individual (grave No. 7a) from the Đurine ćelije site. These changes observed on skeletal remains may indicate the presence of gigantism and acromegaly at the same time. However, although the pathological picture indicates a difficult life for the infected person, this disorder did not prevent her from performing physical activities during her lifetime, since there is a noticeable absence of muscle atrophy and pronounced enthesis on the upper and lower extremities. It is difficult or almost impossible to find out to what extent this woman suffered from pain at all, but it seems very likely that she went through some periods of pain or discomfort during her life. The results of the anthropological analysis indicate that during her life, and after her death, she was treated equally by her contemporaries, despite obvious differences in physical appearance and needs for a functional life.

Acknowledgements

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