Case report

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Chondroblastoma of the cervical-thoracic junction: global data and own experience

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Chondroblastoma (CB) – a rare benign tumor of the skeleton that is presented by proliferation of chondroblasts with islands of eosinophilic chondroid matrix. CB accounts for less than 1% of all bone neoplasms, while the spine is affected in only 1.4% of all CB cases. Publications devoted to CB of the spine are sporadic and therefore have a considerable scientific interest due to the rarity of the pathology.

A clinical case of CB of the cervical-thoracic junction of a 38-year-old patient hospitalized to State Institution "Romodanov Neurosurgery Institute of the National Academy of Sciences of Ukraine" in November 2022 is presented. The anamnesis shows that in 2016 a pathological fracture of the Th2 vertebral body was diagnosed. In 2017, a surgical intervention - an open biopsy of the Th2 vertebral arch was performed in a private clinic, but the histopathological analysis, due to the insufficient amount of material and the absence of clinical data, was descriptive, with a certain diagnostic number of possible nosologies. Additional treatment was not performed. When applying in 2022 to the State Institution "Romodanov Neurosurgery Institute of the National Academy of Sciences of Ukraine", significant negative dynamics were noted: a fracture of the body of the Th1 vertebra, total destruction of the body of the Th2 vertebra, a change in the signal from the body of the Th3 vertebra, which indicated its focal lesion. The surgery was performed in two stages. The first stage included a ventral corpectomy of the Th1–Th3 vertebrae with fusion using telescopic body replacement implant and a ventral rigid plate. During the second stage laminectomy of the Th1–Th3 vertebrae with complete resection of the Th2 costotransverse joints and partial of Th1–Th3 ones was performed. Stabilization system screws were installed transarticularly in the facet joints C6 and C7, transpedicularly in the bodies of the Th4–Th6 vertebrae. To increase the fusion rigidity, additional fixation of the Th1 vertebra on the right and the Th3 vertebra on the left was performed through the remaining costotransverse joints. The patient was discharged with positive neurological dynamics.

The uniqueness of this case, in addition to the rarity of the histological variant of the pathology, lies in the possibility of tracking the dynamics of the disease on the basis of both neuroimaging methods and pathohistological and immunohistochemical diagnostics.

Features of the prevalence of spine CB in the population, the specific signs when performing a spiral computer and magnetic resonance imaging, macroscopic, histological and immunohistochemical characteristics of the tumor are considered in detail. The literature data on differential diagnosis, treatment methods and prognosis of disease are organized.

The material is of interest to specialists, since the timely selection of an adequate treatment method and its volume determines both the probability of tumor recurrence as well as prognosis concerning the patient's life expectancy.

Keywords: *chondroblastoma; spine; cervical-thoracic junction; histopathology; differential diagnosis; treatment tactics; prognosis.*

Chondroblastoma (CB), or Codman's tumor, is a rare benign tumor of the skeleton (bones and articular surfaces), mainly characterised by epiphyseal or apophyseal areas of tubular bones, consisiting of chondroblasts and islands of eosinophilic chondroid matrix [1]. In young patients, CB resembles cartilaginous tissue in structure and is characterized by a slow growth rate. According to the WHO bone tumor classification of the fourth edition, CB is classified as "intermediate, rarely metastatic", but the fifth edition adopted in 2020, considers CB as a benign tumor [2, 3].

In 1927, the American neurosurgeon of Russian origin A. Kolodny first described the neoplasm as a "giant cell tumor containing cartilage" [4, 5]. J.S. Ewing in 1928 defined CB as a "calcifying giant cell tumor" [6], and E.A. Codman in 1931 - as "epiphyseal chondromatous giant cell tumor", describing its structure and growth specificity in detail [7, 8]. Currently, proximal humerus chondroblastoma is also referred to in the specialized literature as "Codman's tumor". The name "chondroblastoma" used in modern nomenclature was proposed in 1942 by H.L. Jaffe and L. Lichtenstein due to the cartilaginous nature of the neoplasm and nonspecific character of giant cells [9].

CB accounts for less than 1% of all bone neoplasms. Most often, CBs occur in the epiphyses of long tubular bones, in about 70% of cases they are registered in the humerus (the most frequent localisation), femur and tibia bones [10–13], rarely (in 10% of cases) in the hands and feet bones [14]. It is thought that CB can occur in any secondary ossification centre, for example, in the large acetabulum [15]. There are also secondary ossification centres in the vertebrae, but these are extremely rarely considered to be the zone of CB formation. The spine has been reported to be affected in only 1.4% of cases of CB [16]. According to the data of Bo-Wen Zheng et al., as of April 2020, there were 61 reliably confirmed cases of spinal CB in the literature [17].

Clinical case

A 38-year-old patient, presented to the State Institution "Romodanov Neurosurgery Institute of the National Academy of Sciences of Ukraine" in November 2022 with complaints of pain in the cervical spine with radiation to both upper limbs, more to the left limb, mild weakness and cramps in the lower limbs. From the medical history, she is known to consider herself ill since 2016, when she first experienced neck pain. There was a severe deterioration after a course of manual therapy at the end of 2016. After performing magnetic resonance imaging (MRI), a pathological fracture of the Th2 vertebral body in the form of a 3-4 mm thick strip was verified (grade III biconcave deformity according to the classification of H.K. Genant et al. [18]) ***(Fig. 1)***.

Heterogeneous pathological tissue was visualized, hypointense and isointense on T1 and T2-weighted images (WI), extending epidurally at the level of Th1–Th3 vertebrae and paravertebrally ventrally. The spinal cord is compressed dorsolaterally to the right. On the basis of MRI findings, tuberculous spondylitis was diagnosed.

An open biopsy of the Th2 vertebral arch was performed at a private clinic in Kyiv in 2017. After surgery, the patient noted a decrease in pain intensity. Pathohistological analysis was conjectural and descriptive indicating a number of probable nosologies due to the insufficient amount of material, as well as due to the absence of clinical data. The patient was discharged without further recommendations. No follow-up examinations were conducted until 2022.

Neurological status during hospitalization: no pathology was detected on the part of the cranial nerves. Strength in the upper limbs is 5 points, decreased in the hands to 4 points, in the lower limbs 4-5 points, hypoesthesia in the C7–Th2 dermatomic area. Tendon and periosteal reflexes from the upper limbs are brisk, symmetrical, from the lower limbs - high with an expanded reflexogenic zone. Positive pathological plantar reflexes. Local tenderness in the area of the cervical-thoracic junction during percussion. Destruction of Th1–Th3 vertebral bodies with the spread of a pathological neoplasm into the spinal canal and ventrally into soft tissues is determined on spiral CT. The mass has a clear sclerotic contour ***(Fig. 2)***. The 3D reconstruction visualises the defect of the Th2 vertebral arch - the area of surgical intervention ***(Fig. 2, B)*** as well as the spread of tumour tissue into the intervertebral foramens, which probably caused pain and paresis in the hands.

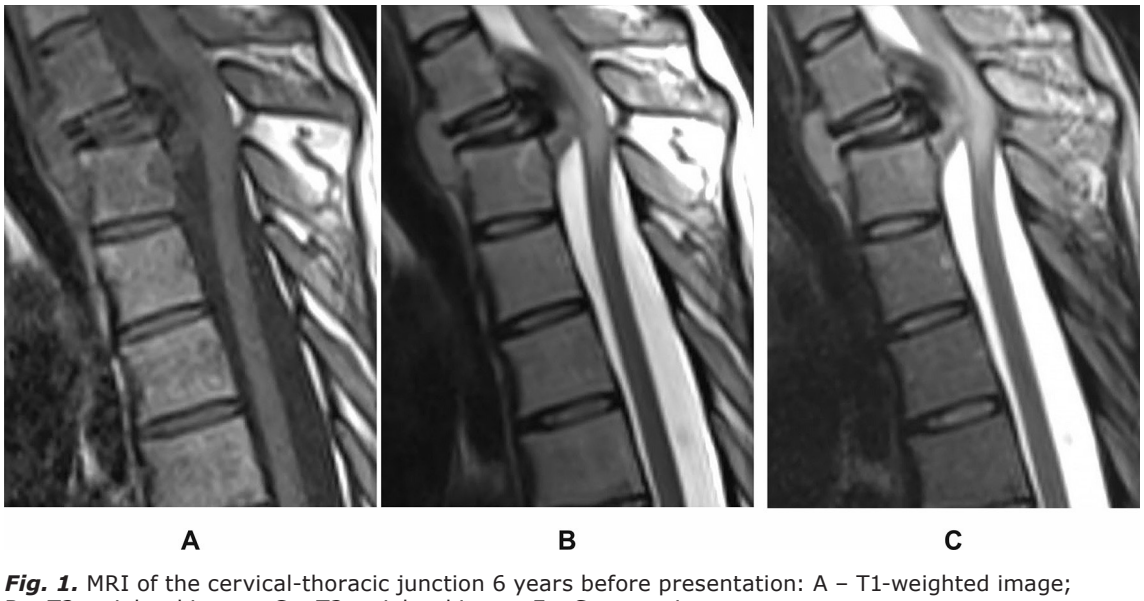


Fig. 1. MRI of the cervical-thoracic junction 6 years before presentation: A – T1-weighted image; B – T2-weighted image; C – T2-weighted image Fat Suppression

This article contains some figures that are displayed in color online but in black and white in the print edition.

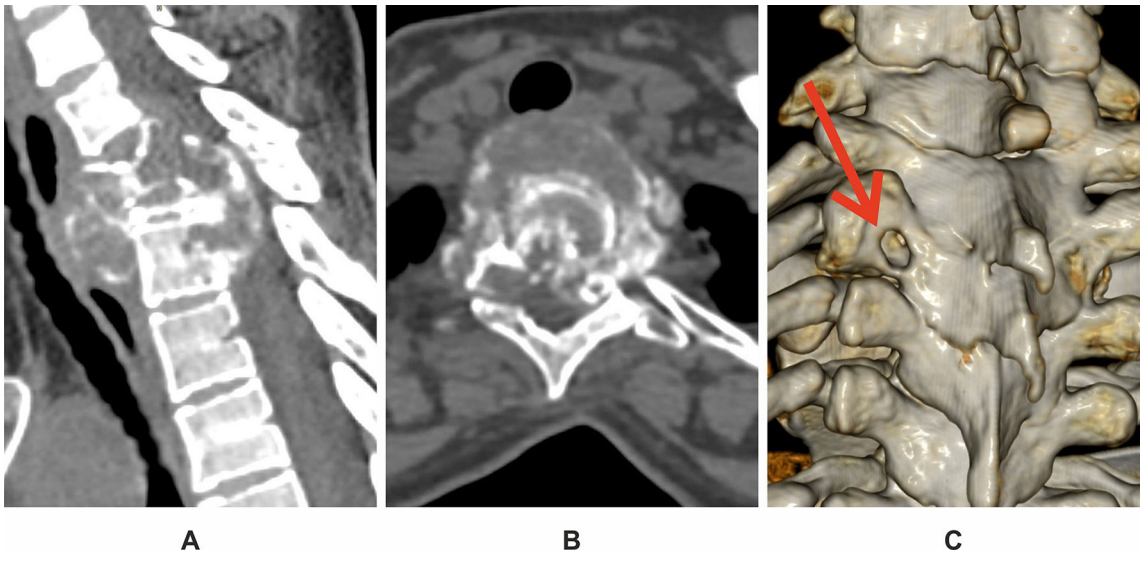


Fig. 2. Spiral computed tomography of the cervical-thoracic junction area during hospitalization: A – sagittal reconstruction; B – section at the level of the Th2 vertebra; C – 3D reconstruction. Posterolateral projection. The arrow indicates the postoperative arch defect

The MRI performed during hospitalization revealed a significant negative change compared to 2016 ***(Fig. 3)***. A fracture of the Th1 vertebral body is visualized, as well as a change in the signal from the Th3 vertebral body, indicating a focal lesion. A solid part of the tumour, located in the spinal canal, entails significant compression of the spinal cord. The tumour tissue structure is heterogeneous, hypointense in the T1-33 mode, weakly hyperintense in the T2-33 mode, and hyperintense in the T2-33 mode with suppressed signal from fat tissue. Small (<3 mm) areas of sharply hyperintense signal, probably corresponding to cystic masses, are determined in the T2-33 mode. An area of moderate peritumoral edema is visualized.

Given the large lesion, in order to reduce the volume of blood loss and reduce the risk of increasing neurological deficit, it was decided to perform surgery in two stages. The first stage involved a ventral corpectomy of Th1–Th3 vertebrae. Due to the constitutional features of the patient (low location of the sternum), the classical approach according to Smith–Robinson was used. After blunt dissection of the soft tissues, a voluminous ovoid-shaped neoplasm with a clear contour, partially sclerosed, was found, which was not fused or infiltrating the adjacent tissues. The neoplasm is represented by granular yellow-brown tissue, in which small-sized cavities (similar to aneurysmal cysts) and numerous hemorrhages are detected. Dirty grey areas corresponding to the chondroid matrix are clearly visible. Dotted inclusions are foci of calcification (calcinosis). A small area of sclerosed bone is identified on the periphery of the CB. After removal of the bulky mass, the spinal dura mater was visualized unchanged throughout. Reconstruction of Th1–Th3 vertebral bodies was performed using a telescopic body replacement implant. Fusion was supplemented with a ventral rigid plate fixed with locking screws to the vertebral bodies of C7 and Th4 ***(Fig. 4)***. The total volume of blood loss was 1200 ml. Hemoglobin values did not fall below 96 g/l in the postoperative period. The cervical region was additionally stabilised with a rigid orthosis.

In the postoperative period, the patient noted a decrease in the intensity of pain sensations. No negative neurological dynamics were registered.

The second stage of surgery was performed 3 weeks after the first one. When planning the volume of posterior decompression, the high risk of stabilization failure due to the transition of the highly mobile cervical region to a rather rigid thoracic region, as well as data on the extent of the pathological process were taken into account. A median approach with skeletonization of the spinous processes and arches, as well as facet joints C6-C7 and costotransverse joints Th1–Th6 was performed in the abdominal position of the patient. Laminectomy of Th1–Th3 vertebrae with complete resection of Th2 costotransverse joints and partial Th1–Th3 was performed. To confirm complete removal of the pathological process along the contour of the resection window, material was taken for histopathological examination. Stabilization system screws were installed transarticularly in the facet joints C6 and C7, transpedicularly in the vertebral bodies of Th4–Th6. Additional fixation of the Th1 vertebra on the right and Th3 vertebra on the left through the remaining costotransverse joints was performed to increase the rigidity of the structure. Beams are mounted using cervical-thoracic adapters. Additionally, 2 transverse ties are installed ***(Fig. 5)***.

In the postoperative period, the cervical region is fixed with a collar. The main complaints were moderate pain in the postoperative wound area, which gradually regressed. There was a decrease in the severity of hypoesthesia in the C7–Th2 dermatomic area compared to the preoperative period.

The diagnosis was verified by morphological study with comparative retrospective evaluation of the pathohistological material of surgical interventions in 2017 and 2022. In the histological preparations of the first surgery, stained according to review techniques, in which the tissue volume was <0.5 cm^3, changed bone tissue was determined ***(Fig. 6,A)***, single large

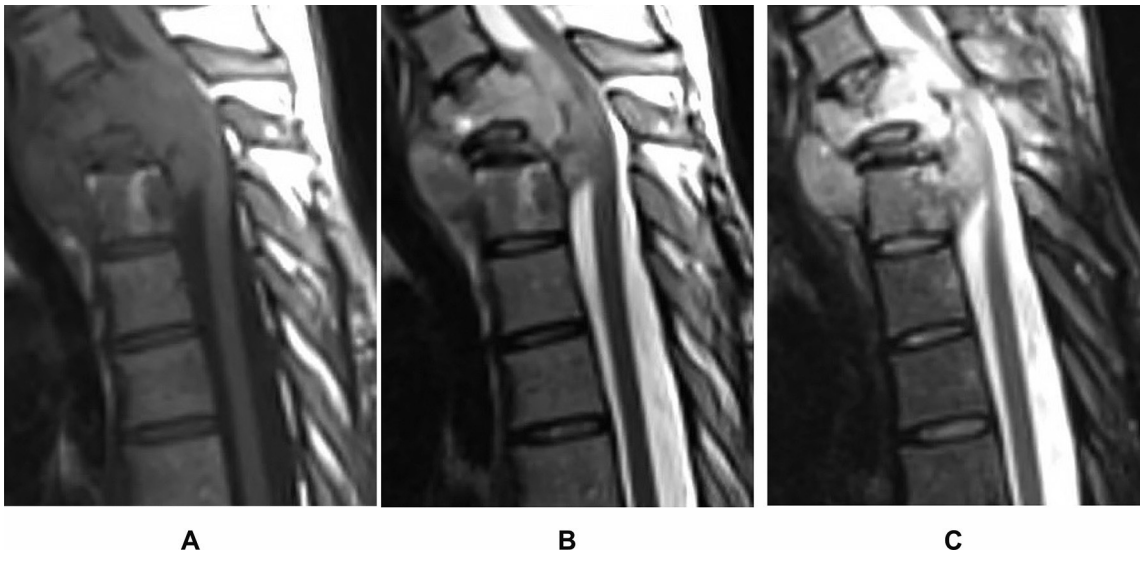


Fig. 3. MRI of the cervical-thoracic junction of the patient at admission: A – T1-weighted image; B – T2-weighted image; C – T2-weighted image Fat Suppression

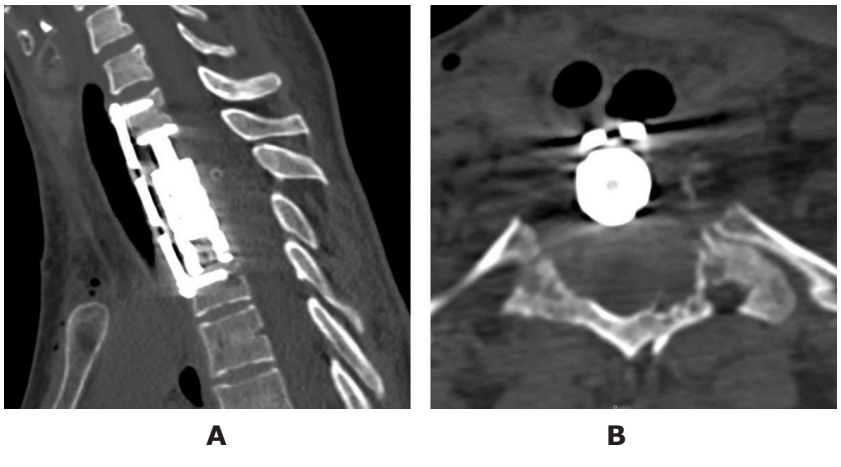


Fig. 4. Spiral computed tomography of the cervical-thoracic junction after the first stage of surgery: A – sagittal reconstruction; B - section at the level of the Th2 vertebra

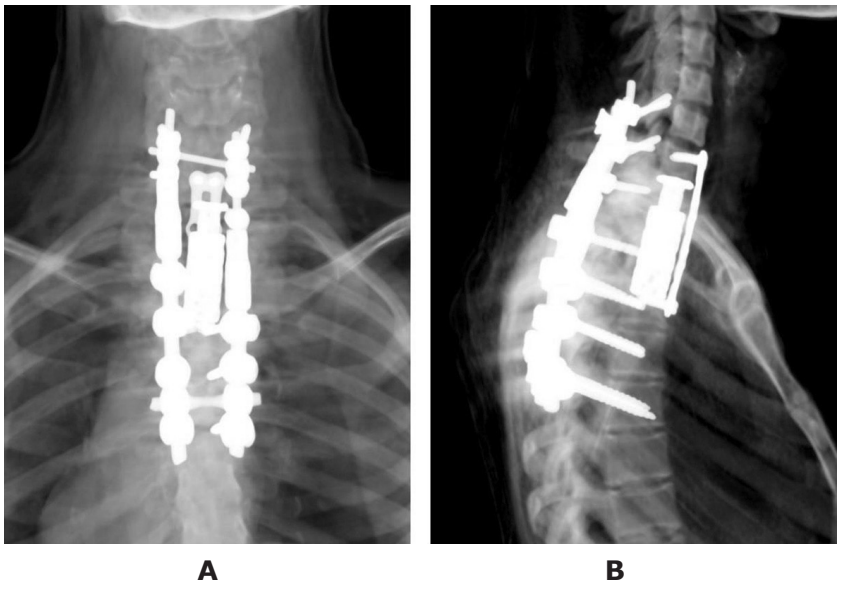


Fig. 5. *Radiography of the area of the cervical-thoracic junction after the second stage of surgery: A – anteroposterior projection; B – lateral projection*

cells, nuclear polymorphism, vacuolated cytoplasm and vessels of the sinusoidal type ***(Fig. 6,B)***.

On microscopy of the tissue of the resection surgery (the first stage in our institution) the tumour is represented by a proliferate of densely located polymorphic chondroblasts (cell polymorphism) and cartilage matrix with single giant multinucleated cells localized near the resorption zones of bone beams ***(Fig. 7)***. Chondroblasts are polymorphic, round or oval in shape, with nuclei of different sizes (nuclear polymorphism), in which nucleoli are usually undetectable. Several nuclei were observed in some tumour cells, but mitoses were few and atypical mitoses were not detected ***(see Fig. 7)***.

Connective tissue layers forming particles - alveolar structure are defined ***(Fig. 8, B)***. Chondroblasts surround calcium deposits with a typical multifaceted shape, forming a characteristic and pathognomonic picture of a "wire mesh". Calcification loci are a characteristic and important diagnostic feature of CB ***(Fig. 8, B)***.

There was a deposit of calcium salts (small foci of calcification) between and around tumour chondroblasts ***(Fig. 8, A)***, massive areas of calcification were found in the matrix of dystrophically changed hyaline cartilage, which underwent coagulation changes in some areas ***(see Figs. 7 and 8)***.

When conducting an immunohistochemical study for the objectification of proliferative activity (Ki-67), it was found that the share of immunopositive nuclei in the material of both operations (2017, 2022) accounted for <3% in high power fields ***(Fig. 9, A,B)***.

Thus, there was no increase in the degree of atypia, the disease progression was due to the fact that the first surgery (open biopsy) was aimed at histological verification of the nature of the process without removing the volume of the neoplasm proper. Pathohistological material taken during the second stage of surgery (control of radical removal) did not contain any evidence of tumor tissue.

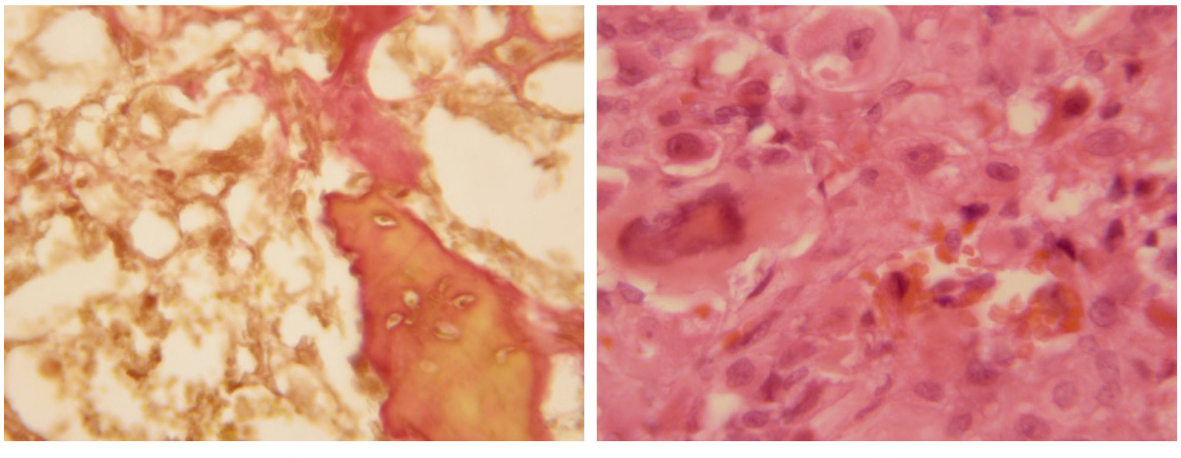


Fig. 6. Chondroblastoma: A - small thinned bone beams are determined. Staining with hematoxylin and picrofuxin. ×400; B - tumour proliferate, giant multinucleated cell, capillary type of intratumour blood supply. Staining with hematoxylin and eosin. ×800

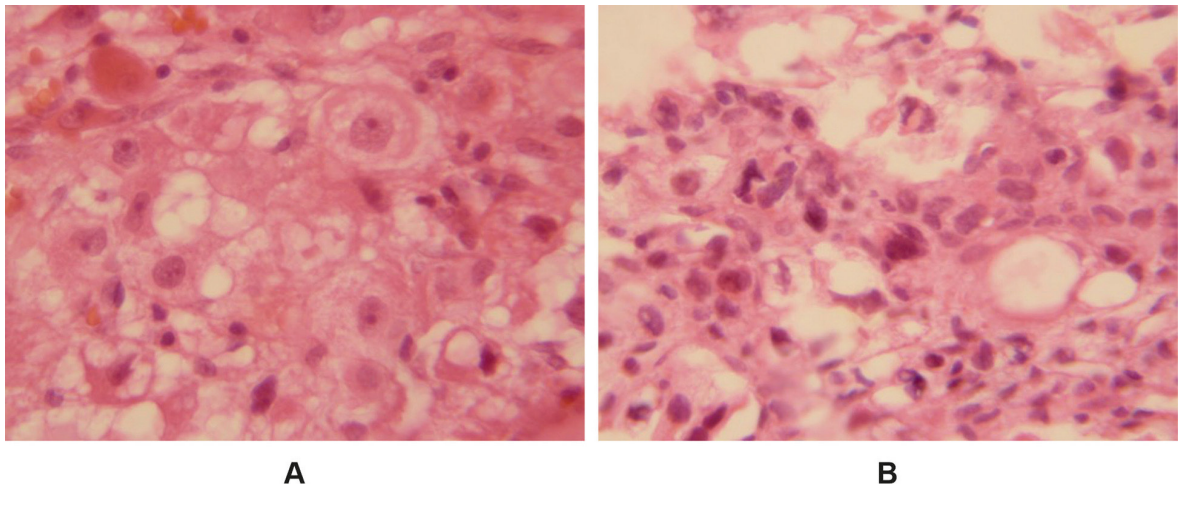
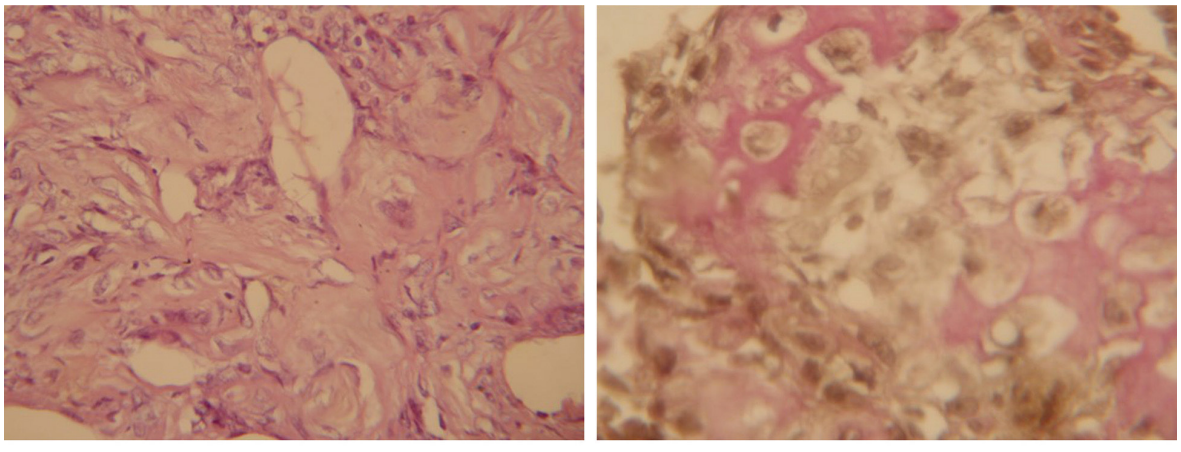
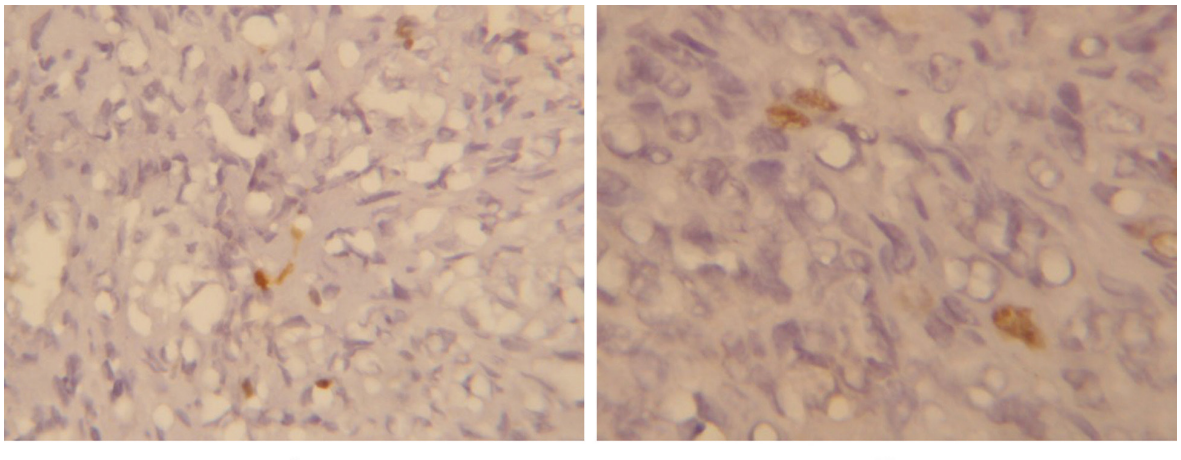


Fig. 7. Structure of chondroblastoma: A – tumour proliferation, cellular and nuclear polymorphism, myxomatosis of the intercellular matrix. Staining with hematoxylin and eosin. ×800; B - alveolarity, small cysts, cellular and nuclear polymorphism. Staining with hematoxylin and eosin. ×400



A B

Fig. 8. Chondroblastoma. Alveolarity of histoarchitectonics: A – local fibrosis of stroma fibers, single giant multinucleated cells. Hematoxylin and eosin staining. ×250; B – myxomatosis of the intercellular cartilage matrix. Hematoxylin and picrofuxin staining. ×800



A B

Fig. 9. Chondroblastoma (2017 material). Immunohistochemical study. Assessment of the proliferative activity index KI-67. Immunopositive nuclei, additional staining with hematoxylin: A – ×450; B – ×800

Our findings are consistent with those of other researchers who describe CB as fields of immature chondroblasts alternating with areas of more mature cells that are peculiarly arranged in the chondroid matrix. In addition to chondroblasts, small multinucleated osteoclast-like cells (singular or in clusters) are found, sometimes arranged around areas of microbleeds, calcification, and coagulation zones. Less mature chondroblasts are structurally very similar to stromal cells of a giant cell tumor, with the presence of osteoclast-like multinucleated giant cells in such areas of CB. This requires a differential diagnosis with giant cell bone tumor (osteoblastoclastoma) [1]. Aneurysmal bone cyst-like changes are common (82.8%), sometimes so distinct that they complicate differential diagnosis [19].

In this case, myxoid changes in the intercellular matrix are moderate, whereas the fibroblast-like cell fields are large in area (occupying more than 5 fields of view (×200)). If cavities filled with blood elements are detected during the pathohistological examination, a differential diagnosis with the cystic form of CB should be carried out (comparison with clinical and radiological findings).

Discussion

Chondroblastoma is predominantly diagnosed in young people. The most typical age of onset is the second decade of life. The female to male ratio is 1.0:2.0–1.0:3.5 [19]. It has been observed that that when CB develops in patients outside the usual age range, it tends to atypical localization [10, 20]. The incidence of CB in patients over 40 years of age is 0–13% [19]. Most often, CB is found in the cervical region of the spine, least often in the lumbar spine and sacrum [21–23]. According to R. Vialle et al., within the vertebra, the tumour almost always (in 95% of cases) simultaneously affects the anterior and posterior support complexes [20]. An isolated lesion of the vertebral body is extremely rare [21]. Although the posterior support complex of the vertebrae during ontogenesis has three ossification centers in the thoracic

region, no cases of isolated CB lesions of the elements of the posterior support complex have been registered. Cases of simultaneous involvement of two adjacent vertebrae have been described [24]. The diagnosis of CB in most cases is associated with a favorable prognosis. Cases of tumour dissemination in the lung with the formation of "benign" metastases are quite rare (2.0–2.9%) [1, 25–28]. Data on multiple tumour spread are doubtful [29, 30].

About 90% of patients with extravertebral CB recover if a thorough total excision of the tumour is performed followed by bone grafting [11]. After adequate surgical treatment, the rate of local recurrence averages from 5 to 10% [10,11,31]. It is believed that there are still no reliable histological parameters (prognostic criteria) that can predict local tumour recurrence [19,28,32], but three clinical variants of CB are distinguished according to the nature of spread and signs of locally destructive growth [33]. The first option rarely recurs after curettage and bone grafting. The second option (less common) has identical histological features, but resembles a malignant tumour with rapid destructive growth and a tendency to multiple recurrences [27,30]. The third (least common) variant is characterized by rapid aggressive-destructive spread and malignant transformation [34–36]. Single published data suggest that CB of the spine usually has a more aggressive course and is more likely to recur compared to a tumour localized in the long bones of the skeleton [37–40].

According to spiral computed tomography and MRI, CB of the spine usually appears as an aggressive osteolytic neoplasm, which is often characterized by invasion into the spinal canal and spreading to the soft tissues paravertebrally [33, 39]. The cartilaginous nature of the neoplasm can be suspected by calcifications, which are sometimes detected on spiral CT scans. In some cases, the tumour is characterized by a completely or partially sclerosed contour [21, 41]. Most imaging features of this neoplasm are nonspecific and diagnostically uninformative. For example, the association between calcification and aggressive spinal lesions does not clearly distinguish CB from chondrosarcoma of the spine [42, 43]. The MRI picture is often characterized by a weak signal on T1-33, moderate - in the STIR mode with peritumoral edema, isointense and hyperintense - on T2-33 with signs of structural heterogeneity [41]. The presence of bone marrow edema, often surrounding CB of extravertebral localization, helps to deny pathologies for which edema is not characteristic (chondromyxoid fibroma, osteoblastoclastoma, enchondroma) [14]. Bone marrow edema in the structure of the unchanged fragment of the vertebral body is not found in all cases [39, 44].

Macroscopically, CBs are usually clearly delineated eccentric grey-yellow masses with a thin sclerotic rim. The density varies from soft to elastic with hemorrhagic areas and small calcifications, which cause a sandy cut surface [45]. A blue-grey chondroid matrix is sometimes visually identified. Aneurysmal bone cysts are visualized as blood-filled areas [11, 46].

With a fine-needle aspiration biopsy, cytomorphological features of CB are the presence of mononuclear chondroblasts, multinucleated giant osteoclast-like cells, and chondroid matrix [47]. When using special staining techniques, the cytoplasm of chondroblasts is basophilic pale, round or oval nuclei with fine, evenly distributed chromatin and longitudinal nuclear grooves are observed. The chondroid matrix is green-purple color in the Papanicolaou test and purple color in the Romanowsky–Giemsa staining [45]. It has been noted that in atypical localization of CB, the absence of inflammatory cells and the presence of typical chondroblasts even without chondroid transformation of the intercellular matrix is sufficient to establish the diagnosis [48].

Most often, CBs have a complex cellular structure due to their development in the bone growth zone with epiphyseal part extension. This complicates histopathological verification. M. G. Kunkel et al. described a tumour variant with features of both CB and chondromyxoid fibroma [49]. Currently, many mixed forms of CB have been described. The classification of S.I. Lipkin and A.K. Morozov which distinguishes the following forms of CB is known in domestic clinical practice. [50]:

I. Typical form of CB.

II. Mixed forms of CB:

a) CB with chondromyxoid fibroma;

b) CB and osteoblastoclastoma;

c) cystic form of CB bone;

d) Chondromal form of CB bone.

III. Malignant forms of CB of the bone:

a) primary malignant CB;

b) malignant CB (progression to chondrosarcoma, chondroblastic osteogenic sarcoma).

Since more than 95% of CB contain the P.K36M mutation in the H3F3A (chromosome 1) or H3F3B (chromosome 17) gene, molecular analysis using H3F3 K36M antibodies is a sensitive and specific method for establishing the diagnosis [51–53]. As noted in pathohistological manuals, the molecular technique is particularly useful for small amount of biopsy material or to verify the nature of neoplasms with large aneurysmal cysts, when microscopic examination is inconvenient [54]. For immunohistochemical analysis, antibodies to SOX9 (one of the main transcription factors for chondrogenesis), S100 protein (characteristic of cartilaginous tumours), cytokeratins 7, 8, 18 and 19, as well as DOG1 (Discovered on gastrointestinal stromal tumour 1), but they are not specific for CB can be used. These markers may only be present at specific sites of the neoplasm [55–58]. P63, a member of the p53 family of tumour suppressor genes, which is regarded as a promising biomarker of giant cell tumours, is positive in almost half of all cases of CB, according to Qi Jia et al. which complicates the differential diagnosis [59,60]. Indicators of proliferative activity (according to Ki-67) for CB of the spine are detected at a rate of 2–15% [61, 62], which is confirmed by our observation.

The differential range of histological diagnoses in CB of the spine contains a long list of osteolytic processes: 1) osteoblastoma, 2) chordoma, 3) histiocytosis X (eosinophilic granuloma), 4) aneurysmal bone cyst, 5) osteoblastoclastoma (giant cell tumor), 6) clear cell chondrosarcoma, 7) chondromyxoid fibroma, 8) extraosseous primary tumor metastases, 9) spondylitis [33].

Osteoblastoma, which may have features of an aneurysmal bone cyst, like a true aneurysmal bone

cyst, occurs more frequently in the vertebral arch and affects the vertebral body secondarily [2, 63, 64]. Chordoma affects both the vertebral body and the arch. An early characteristic radiological sign of chordoma is the destruction of the disc and the associated narrowing of the intervertebral space [64, 65]. Eosinophilic granuloma develops predominantly in the vertebral bodies, appearing radiologically as a uniform compaction thereof [2, 63]. Giant cell tumor of the spine is osteolytic and is usually characterized by the direction of growth from the body to the vertebral arch [11, 66, 67]. The spine is very rarely affected by osteosarcoma, while the process localising mainly to the vertebral body and rarely spreading to the arch [68–72]. Spondylitis and other infectious diseases of the spine may have computed tomography or MR signs similar to those of CB of the spine [73–75].

The significance of clinical and pathomorphological factors in predicting the course is poorly understood. However, a review of the literature reveals a number of regularities [17]. It has been noted that the occurrence of a neurological deficit before surgical removal of the tumour is an unfavorable factor in predicting the recurrence-free period. According to the researchers, this can be explained by the fact that the presence of neurological deficits is indicative of a higher degree of tumour infiltration. Significant compression of nerve structures, which determines neurological symptoms, complicates complete resection and therefore increases the risk of recurrence [60]. Neurological disorders, as well as other associated complications, are thought to have a negative effect on the immune system, inhibiting the antitumour immune response and leading to some extent to relapses [76,77].

Although, according to the official WHO opinion, the pathohistological features of CB have no prognostic value, some authors have noted that the presence of reticular calcification of the eosinophilic matrix may have some diagnostic value [19, 45]. Osteopontin, a secreted phosphoprotein that determines both normal and pathological mineral deposition, is known to be one of the molecular determinants of ectopic calcification [78]. Osteopontin has been shown to be a natural inhibitor of ectopic calcification *in vivo*. It has been proven that osteopontin can lead to the growth, invasion and metastasis of various malignancies [79]. Based on the data, it has been suggested that the presence of a peculiar spatial calcification may be due to reduced expression of osteopontin in tumour tissue and, as a cosequence, is associated with a less aggressive phenotype and a better prognosis for patients [17]. According to the data of a number of researchers, matrix calcification in spinal CB is detected/diagnosed at a rate of about 50%, which is inconsistent with the more aggressive growth of tumours of this localisation [39, 42].

A higher recurrence rate has been reported in cases where the tumour contains an aneurysmal bone cyst component [15, 80]. In addition, the presence of a cyst in CB of the spine is accompanied by significantly lower patient survival rates [17]. One of the possible explanations for this phenomenon is that CB combined with an aneurysmal bone cyst may be characterized by a more aggressive course of the disease, with accelerated tumour invasion into the surrounding tissues and bone destruction, leading to adverse outcomes [81].

Since spinal CB, unlike CB in the long bones, is more aggressive, surgical removal has been found to be the only effective method of treatment [20, 39, 41]. A number of studies have demonstrated that the likelihood of tumour recurrence is lower and the duration of the recurrence-free period is longer, the more radical the surgical intervention is performed [60]. In contrast to CB of other localisations, where removal of the tumour and curettage of its bone bed is usually sufficient, corpectomy with resection of the affected structures of the posterior support complex up to a total en-block vertebrectomy is preferable for spinal lesions [82].

The appropriateness of adjuvant radiation therapy for CB is controversial. Thus, in a number of studies, it is indicated that the use of this technique is likely to cause the progression of tumour growth, which reduced the survival rate of patients. It has been found that radiation therapy can induce malignant transformation of a tumour into sarcoma, which worsens the overall prognosis [23, 83]. On the other hand, there is an opinion that radiation therapy does not accelerate the progression of CB of the spine and, therefore, can be used as a therapy option in patients with postoperative disease recurrence or in cases where surgery cannot be used for certain reasons [22, 38] .

Controversy in tactical approaches to spinal CB therapy may be due to the small number of observations and the fact that in most cases radiation therapy has been used in patients with incomplete tumour resection, which, as mentioned above, is itself associated with a high probability of recurrence [17]. Published data suggest that radiation therapy can induce specific changes in tumour-associated fibroblasts, capable of maintaining an active microenvironment and causing growth progression [84]. In addition, it is suggested that radiation therapy may induce the formation of new stem cells in the malignant tissue structure [85]. There is an unequivocal opinion that preoperative treatment can significantly affect the clinical outcome, since previous radiation therapy can cause biological transformation of the tumour and complicate verification of the tumour tissue growth, thereby reducing the survival of patients [23]. In view of the isolated cases of application of this tactic of spinal CB, this claim needs to be investigated. Currently, there is no effective pharmacotherapy for CB [23]. Individual publications suggest the possibility of using drugs based on monoclonal antibodies, but their efficacy needs to be confirmed [86].

Conclusions

Chondroblastoma of the spine is a rare pathology that is difficult to differentiate from other osteolytic processes using only spiral computed tomography and MRI data.

In our opinion, correct differential diagnosis is possible only with multidisciplinary comparison of the histological picture with clinical data and instrumental dynamic examination to negate tuberculous lesions, non-specific inflammatory diseases, primary benign and malignant tumors, dystrophic cysts of the pineal glands caused by spontaneous aseptic necrosis.

Being aware of such a rare neoplasm for the spinal column is important for specialists, since the timely selection of an adequate surgical treatment method determines both the likelihood of recurrence and the prognosis of the patient quality of living and life expectancy.

Disclosure

Conflict of interest

The authors declare no conflict of interest.

Informed consent

Informed consent has been obtained from the patient to release the data while respecting anonymity.

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