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Successful Treatment of Disseminated Angiosarcoma of the Liver in a Child: Aspects of Surgery. Literature Review and Own Clinical Observation

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Abstract

Introduction: Malignant liver tumors are rare in childhood, accounting for 1.1-1.4% of all tumors in children, including hemoblastoses and CNS tumors. Liver angiosarcoma (LA) is even less common, accounting for less than 0.5% of all primary liver tumors in children. LA is characterized by early hematogenous and lymphogenous metastasis, rapid invasiveness and high resistance to treatment. Combined and comprehensive methods are used to treat LA. Meanwhile, the surgical method has a special, one might say leading place in the treatment of this disease. In the case of isolated liver damage by a tumor, when radical resection (R0) is possible, the 5-year survival rate of patients is 65%. Unfortunately, 40-60% of primary patients already have distant metastases by the time of admission to oncology hospitals, which significantly worsens the long-term results of LA treatment. That is why each new case of successful treatment of disseminated form of LA in children deserves interest.

Aim: to demonstrate the capabilities of modern methods of oncosurgery in the treatment of metastatic angiosarcoma of the liver in children. Clinical observation: A 6-year-old girl fell ill in December 2014, when she complained of abdominal pain not related to food intake, weakness, and temperature rises to 39 ° C without apparent cause. The tumor in the abdomen was discovered by the child's parents as an accidental finding. During examination at the oncology hospital at the place of residence (ultrasound, CT, tumor biopsy), a large-sized LA was diagnosed, the lower border of the tumor reaching the crest of the wing of the right iliac bone. Metastases were detected in the lymph nodes and spleen. Stage IV of the disease was diagnosed. After 6 courses of neoadjuvant polychemotherapy, carried out with a positive effect, in July 2015, an operation was performed in the amount of resection of liver sections, thermal ablation of tumor foci with their subsequent removal using water-jet dissection, splenectomy with resection of a part of the tail of the pancreas.

After the surgery, adjuvant chemotherapy was performed. Three months later, a metastasis of LA was detected in the lower third of the right tibia, confirmed by a biopsy of the thigh tumor. After preoperative chemotherapy, distal resection of the right femur with knee arthroplasty with a "growing" endoprosthesis was performed in December 2016. Then, postoperative chemotherapy was carried out according to the anti-relapse treatment protocol until May 2017. At the end of December 2018, a solitary metastasis was detected in the upper lobe of the left lung, for which left-sided thoracotomy and atypical lung resection for metastasis were performed. After the surgery, adjuvant chemotherapy was carried out until September 2019. Since then, antitumor treatment has been discontinued. Despite the rarity and severity, the girl is in complete clinical remission. Dynamic monitoring of the child is underway to this day. The patient is 16.5 years old, she is completely healthy, control examinations do not reveal signs of relapse of the disease.

Conclusion: Despite the rarity of LA in children, the severity of the disease, adequately conducted combined treatment using innovative surgical methods, allow achieving recovery even in cases of disseminated LA.

Keywords: Rare tumors, Liver angiosarcoma, Metastases, Liver and Lung Resections, Radiofrequency Ablation, Endoprosthetics of large joints.

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Introduction

Liver neoplasms in pediatrics are rare but significant pathologies. Every year, about 175 thousand new cases of malignant neoplasms are diagnosed worldwide, of which liver tumors account for about 1.1%. Among them, hepatoblastoma, hepatocellular carcinoma and liver angiosarcoma are most often diagnosed [1]. One of the most aggressive and prognostically unfavorable malignant tumors of the liver is angiosarcoma, which accounts for less than 0.5% of all primary liver tumors in children [2]. Arising from the vascular endothelium, accompanied by early hematogenous and lymphogenous metastasis, the tumor has rapid invasiveness and high resistance to treatment. Liver angiosarcoma (LA) is most common in the adult population (60-70 years) and is associated with exposure to carcinogens (vinyl chloride, thorotrast, arsenic), while in pediatric practice it is even less common and has no established etiological factors [3]. According to the literature, LA can debut in infancy [4,5].

Diagnosis of LA in children is associated with significant difficulties due to the non-specificity of the clinical picture. As studies show, among the clinical manifestations of the disease, the most frequently recorded are abdominal pain, fever of unknown genesis and hepatomegaly, which in 70% of cases is initially interpreted as an infectious process or a benign neoplasm [4,6]. Cases in young children, including the neonatal period, where LA can imitate benign vascular malformations, present a particular diagnostic challenge [4]. The visual characteristics of LA have certain pathognomonic features. In computed tomography, the tumor appears as a heterogeneous formation with characteristic contrast and the presence of hemorrhagic cavities [7]. Magnetic resonance imaging demonstrates a hyperintense signal on T2-weighted images with areas of vascular voids, which reflects the angiogenic nature of the neoplasm [3]. However, these signs are not absolutely specific and require mandatory histological confirmation [5].

Histological diagnostics of LA is based on the identification of characteristic morphological signs: proliferation of atypical endothelial cells forming anastomosing vascular clefts and pronounced cellular atypia. Immunohistochemical examination plays a key role in differential diagnostics, demonstrating expression of vascular markers CD31, CD34 and ERG in 95-100% of cases. Determination of proliferative activity is of particular prognostic value: the Ki-67 index> 50% is associated with a particularly aggressive course of the disease and resistance to therapy. It is important to note that according to Fenn D. et al., 2024 [8], 30% of patients with LA develop consumptive hypothyroidism caused by tumor expression of type 3 deiodinase, which can serve as an additional diagnostic marker. Modern approaches to the treatment of LA in children are based on the principles of multimodal therapy, including surgery, chemotherapy and radiation therapy. The surgical component remains the cornerstone of therapy, with the radicality of resection (R0) being the most significant prognostic factor [9]. As studies demonstrate, organ-preserving resections using modern technologies, such as water-jet dissection (radiofrequency ablation and their combinations), allow achieving a 5-year survival rate of 65% of patients with localized forms [10]. However, it should be taken into account that 40-60% of patients already have distant metastases at the time of diagnosis, which requires a systemic approach to treatment [11].

Chemotherapeutic protocols for LA in children are mainly adapted from the regimens used for soft tissue sarcomas. The greatest efficiency is demonstrated by combinations based on anthracyclines and taxanes, in particular the CWS protocol, including vincristine, doxorubicin and cyclophosphamide in combination with paclitaxel [12]. According to the German CWS group, this approach allows achieving 5-year relapse-free survival in 64% of patients [11]. It is important to take into account that the use of paclitaxel in children is associated with a high risk of infusion reactions (up to 25% of cases), which requires careful monitoring and possible replacement with nab-paclitaxel [13]. A promising direction in the treatment of LA is targeted therapy, especially in the presence of specific molecular markers. As studies show, mutations in the PIK3CA genes, detected in 30% of patients, create the basis for the use of PI3K kinase inhibitors [14]. In addition, in some cases, antiangiogenic drugs (bevacizumab) and immune checkpoint inhibitors (pembrolizumab) demonstrate effectiveness, especially with PD-L1 expression [15].

However, the use of these methods requires further study in controlled clinical trials.

Aim: to demonstrate the capabilities of modern methods of oncosurgery in the treatment of metastatic angiosarcoma of the liver in children.

Clinical observation: A 6-year-old girl living in the Moscow region fell ill in December 2014, when she complained of abdominal pain not related to food intake, weakness, and temperature increases up to 39 ° C without any apparent reason. At the same time, the grandmother, while stroking the child's stomach, discovered a dense tumor in the abdominal cavity. This radial finding was the basis for the parents to consult a doctor. The girl was hospitalized in the gastroenterology department of the multidisciplinary city children's hospital. An ultrasound examination (US) revealed a tumor in the area of the right lobe of the liver. The child was transferred to the children's department of the Moscow Regional Oncology Dispensary for examination and treatment.

The child's condition upon admission was assessed as objectively severe in terms of the underlying disease. Abdominal palpation revealed a sharp increase in the liver, the dimensions of which were 16.0 x 8.54 x 16.75 cm. The lower edge of the right lobe of the liver was at the level of the crest of the wing of the right iliac bone. On contrast-enhanced computed tomograms, the liver structure is heterogeneous due to the presence of multiple volumetric multichamber formations with a cystic-solid structure, with a predominance of the cystic component, with dimensions from 2.67 x 4.5 to 5.11 x 9.14 cm. In S6 of the right lobe of the liver, there is a tumor node measuring 5.11 x 9.14 cm with a solid component, which most intensively accumulates contrast. The spleen has unclear internal contours, is enlarged to 9.49x3.96x3.43 cm, has a heterogeneous structure, with the presence of cystic-solid formations, ranging in size from 1.49 x 1.83 cm to 4.06 x 6.07 cm. In the projection of the left adrenal gland, a neoplasm is visualized, compressing the spleen and the upper pole of the left kidney, measuring 4.13x5.41 cm, identical in structure to neoplasms in the liver and spleen. Multiple para-aortic lymph nodes without clear contours are determined, merging into conglomerates, ranging in size from 1.04 x 1.49 to 1.81 x 2.32 cm.

At the end of December 2014, on 22.12.14, a fine-needle biopsy of the liver tumor was performed. Conclusion: cytogram of a non-epithelial malignant tumor of elongated spindle-shaped cells. The histological and immunohistochemical examination of the biopsy material allowed us to diagnose liver angiosarcoma (LA). Final clinical diagnosis: liver angiosarcoma, metastases in the spleen, para-aortic lymph nodes, stage IV. From December 26, 2014 to early June 2015, the child underwent 6 blocks of polychemotherapy according to the high-risk CWS protocol. The effect achieved was partial regression of the tumor and metastases. To perform the surgical stage of treatment, on July 6, 2015, the patient was transferred to the V.Y. Voyno-Yasenetsky Scientific and Practical Center of Specialized Medical Care for Children. The child's condition was objectively severe due to the underlying disease, but her health remained satisfactory: the girl was active, had no complaints, and her sleep and appetite were not disturbed.

After discussing the child at an extended consultation of doctors, a decision was made to perform the 2nd stage of treatment - surgical in the amount of resection of all tumor foci in the liver, splenectomy, removal of metastatic lymph nodes. The CT data before the operation are presented in Figure 1. On contrast-enhanced computed tomograms, tumor nodes in the right lobe of the liver and the IV segment of the left lobe are clearly visible, intensively accumulating contrast (Figure 1 a, b, c, d). In addition, tumor nodes were detected in the area of the spleen parenchyma (Figure 1d).

07/14/15 surgery:

Stage 1: two-subcostal laparotomy, abdominal revision, bisegmentectomy (S5 and S6) of the liver, atypical resection of S4. Radiofrequency ablation (RFA) of all small-sized (no more than 2 cm) tumor foci in the liver with their subsequent removal (a total of 6 tumor nodes);

Stage 2: splenectomy with a part of the tail of the pancreas. Biopsy of lymph nodes suspicious for metastases.

Figure 1: *a,b,c,d Contrast-enhanced computed tomography. There are multiple tumor nodes in the right lobe of the liver, marked with red arrows. In addition to the lesion of the right lobe of the liver, there is a lesion of the 4th segment of the left lobe (Figure 1a,b,d) and metastases in the spleen (marked with black arrows, Figure 1c)*

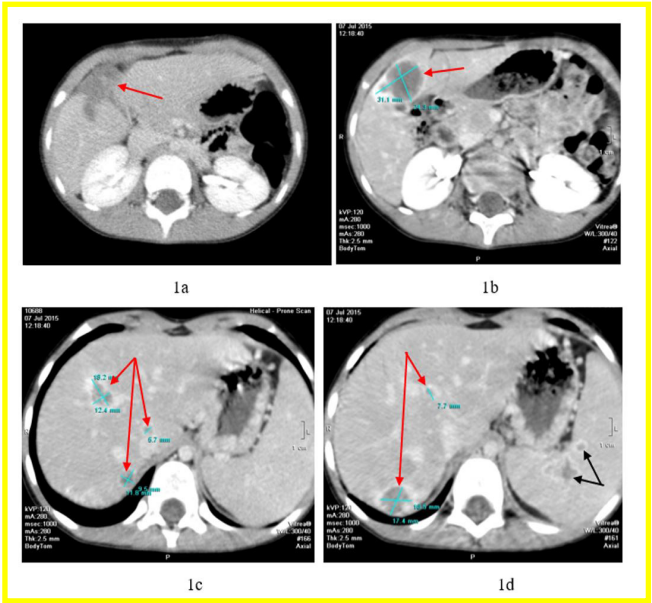
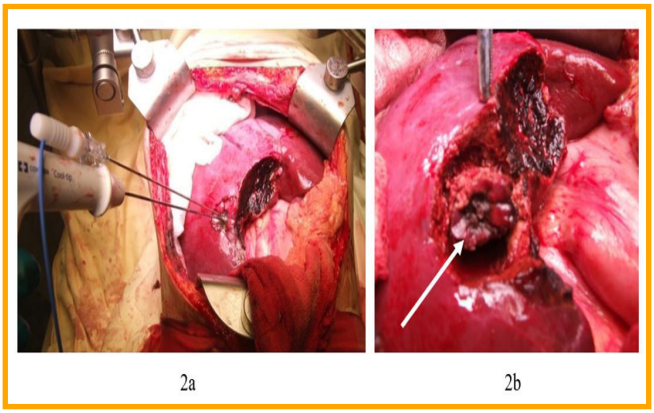


Figure 2: *a,b Stages of the operation. S5-6 was resected using water jet dissection. A needle for RFA and a temperature sensor were inserted into the metastasis located in S6. After completion of RFA, the metastatic focus was removed (Fig. 2b, marked with an arrow)*



Stage 1 of the operation. The right lobe of the liver is mobilized after transecting the round and coronary ligaments. During revision, the tumor nodes are located in VI, VII, VIII and on the border of IV and V segments along the lower edge. A total of 6 tumor nodes were detected. The largest tumors - 3.5 cm in diameter, are located on the border of IV and V (along the lower edge), as well as in segment VII. The remaining four are in segments S6, on the border of S7 and S8 and segment S5. Atypical resection of the liver of segments S5, S6 and S7 was performed. The remaining 4 tumor nodes, up to 2 cm in size, were subjected to RFA, with their subsequent removal. Figure 2 shows the RFA stage of the tumor located in S7 of the liver. RFA and subsequent removal of the remaining three tumor nodes were performed in a similar manner.

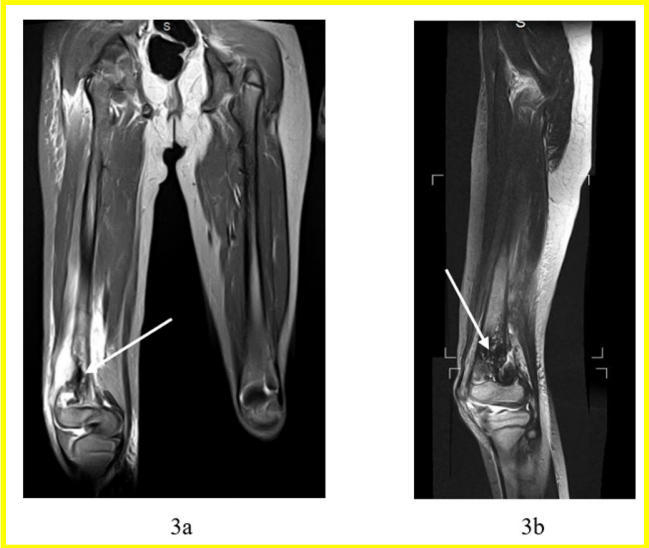
Stage 2 of the operation. When isolating the spleen from the surrounding tissues, it was found that the tail of the pancreas was fused to the spleen. In the middle section of the organ, two tumor nodes 1.0 and 1.5 cm in diameter were found. Resection of the tail of the pancreas was performed. The spleen was removed en bloc with a section of the tail of the pancreas. Retroperitoneal lymph nodes suspicious for metastatic lesions were taken for biopsy. There were no complications during the operation. The postoperative period was uneventful.

Histological conclusion: fragments of the liver, spleen, pancreas, lymph nodes and adipose tissue. All samples have necrotic fields surrounded by fibrous connective tissue with numerous histiocytes and hemosiderophages. There is no vital tumor tissue in the examined material. Histological picture of complete therapeutic pathomorphosis (IV degree). Thus, R0 resection is confirmed. Taking into account the results of histological and immunohistochemical analysis of the surgical material, a decision was made at a consultation of doctors to conduct adjuvant polychemotherapy according to the CWS protocol for the high-risk group.

In October 2016, the girl began to complain of pain in the right hip. The patient underwent examination, including CT, magnetic resonance imaging (MRI) and biopsy of the lower third of the right femur (14.10.2016). Histological conclusion: elements of a malignant neoplasm with pronounced signs of low-grade atypia were detected. Morphological picture of angiosarcoma metastasis to bone. Since October 2016, a stage of anti-relapse chemotherapy has been

performed. In response to the chemotherapy, a positive effect was registered in the form of a reduction in the size of the tumor of the right femur. MRI data before surgery are shown in Figure 3a, b.

Figure 3: *a,b In the presented MRI in the anterior (3a) and lateral (3b) projections in the lower third of the right femur, an area of bone tissue destruction by the tumor process is clearly visible, the periosteum is destroyed (marked with arrows)*

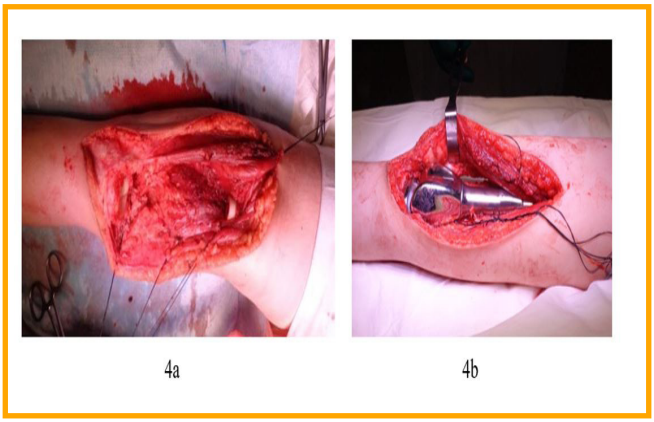


3a 3b

Considering the achieved effect of the chemotherapy on the right femur, the absence of recurrence of the liver tumor and other metastases, it was decided to perform an operation on the child in the amount of resection of the right femur with endoprosthetics of the knee joint. Based on the patient's age, it was decided to install a "growing" prosthesis (sliding) on the child.

22.12.2016 operation: distal resection of the right femur with knee joint endoprosthesis replacement with a "growing" endoprosthesis. The stages of the operation are shown in Figure 4 a, b.

Figure 4: *a. Stage of the operation. Distal resection of the right femur has been performed. The section of the femur with the tumor has been removed.*
Figure 4: *b. Stage of the operation. The installed endoprosthesis is clearly visible in the wound.*



4a 4b

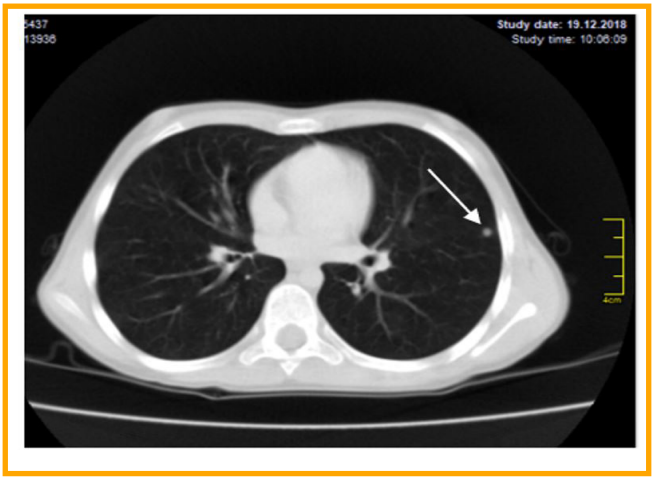
A macroscopic specimen of the removed femur with a tumor is shown in Figure 5.

Figure 5: *Macroscopic preparation of the removed tumor.*

In the postoperative period, the girl received the necessary rehabilitation therapy, the result of which was the complete restoration of the function of the right leg: the patient walks independently, without support, there is no limp. From January to May 2017, the child

underwent anti-relapse chemotherapy. The treatment was tolerated satisfactorily, without complications. In May 2017, antitumor treatment was stopped and the child was dynamically monitored. On December 19, 2018 (after 1.5 years), a control CT scan of the lungs revealed the presence of a focal neoplasm in S4 of the left lung, up to 3 mm in diameter (Figure 6).

Figure 6: *The presented CT scan shows a focal shadow measuring up to 3 mm in diameter in the upper lobe of the left lung in S4 (marked with an arrow)*



During a comprehensive examination of the patient, no data were found for a local relapse of the disease in the liver, right femur, or the presence of metastases in organs and systems. At a consultation of pediatric oncologists and oncosurgeons, a decision was made to remove the metastasis from the left lung.

December 25, 2018 surgery: left thoracotomy, revision of the left lung, atypical resection of the upper lobe of the lung due to metastasis in S4. No other pathological changes were found in the lung. Histological and immunohistochemical examination of the removed area of the upper lobe of the left lung confirmed metastasis of angiosarcoma. From January 2019 to 09/24/19, the patient underwent anti-relapse cyclic program chemotherapy (6 blocks of chemotherapy).

Results

Antitumor treatment has been completed since September 24, 2019. Since then, the patient has been in complete clinical remission under constant dynamic observation of a pediatric oncologist. There are no signs of relapse of the disease. At the time of writing

this article, the patient is 16.5 years old, she is healthy, studies, has no complaints, leads an active lifestyle.

Conclusion

• liver angiosarcoma is a rare malignant disease of childhood, characterized by high tumor aggression and the ability to early lymphogenous and hematogenous metastasis;

• the tumor is sensitive to chemotherapy, which can be administered to children in neoadjuvant and adjuvant regimens;

• even in the presence of local spread of the tumor process in the liver, registered after the end of neoadjuvant chemotherapy, the surgical council should consider all possibilities for performing the surgical stage of treatment, since there is no chance of recovery in a child without removal of the primary tumor (LA). The use of innovative surgical methods during surgery (waterjet and ultrasound dissection, argon plasma surgery, radiofrequency ablation, etc.) will help surgeons to successfully perform the surgical intervention;

• detection of a solitary metastasis, for example, in the bones of a child, cannot be a reason for refusing treatment. Conducting anti-relapse courses of chemotherapy may allow considering issues of surgical intervention, including performing organ-preserving operations - endoprosthetics of large joints;

• a child with LA is subject to long-term and dynamic observation, during which metastases to various organs, such as the lungs, may be detected. In the presence of isolated metastases, the issue of their surgical removal should be considered;

• treatment of children with such a severe pathology as LA requires the presence of pediatric oncologists and oncosurgeons who are able to take responsibility for the life of a child and are able to make decisions in the most difficult clinical situations.

References

1. Petrash EA, Shorikov MA, Mikhailova EV, Panferova TR, Nikulina AL, et al. (2023) Differential diagnosis of benign and malignant liver tumors in children using the method of quantitative assessment of multiparametric magnetic resonance imaging data. Russian Journal of Pediatric Hematology and Oncology 10(2): 63-70.
2. Chaudhari P, Bhadana U, Singh RAK, Ahuja A (2015) Primary Hepatic Angiosarcoma. Eur J Surg Oncol 41(9):1137-1143.
3. McGuire A, Fernandez-Pineda I, Fishman SJ, Dickie BH (2020) Pediatric hepatic vascular tumors. Semin Pediatr surg 29(5):150970.
4. Дмитриев ИВ, Шистерова ОА, Моисеенкова Сдидр (2024) Ангиосаркома печени у ребёнка в возрасте одного месяца. Вестник Смоленской государственной медицинской академии 2):214-217.
5. Gaballah AH, Jensen CT, Palmquist S (2017) Angiosarcoma: clinical and imaging features from head to toe. Br J Radiol 90(1075): 20170039.
6. Ferrari A, Brecht IB, Gatta G (2019) Defining and listing very rare cancers of paediatric age: consensus of the Joint Action on Rare Cancers in cooperation with the European Cooperative Study Group for Pediatric Rare Tumors. Eur J Cancer 110:120-126.
7. Casali PG, Abecassis N, Bauer S (2021) Soft tissue and visceral sarcomas: ESMO-EURACAN Clinical Practice Guidelines. Ann Oncol 32(11):1348-1365.
8. Fenn D, Fung KFK, Liu APY (2024) Paediatric hepatic angiosarcoma with consumptive hypothyroidism - an important diagnostic pitfall to avoid during evaluation of hepatic vascular tumours. Pediatr Radiol 54:1040-1048.
9. Tunn PU, Reichardt P (2018) The role of endoprosthetic replacement for primary bone and soft tissue tumors around the knee. EFORT Open Rev 3(7):381-388.
10. Sparber-Sauer M, Koscielniak E, Vokuhl C (2020) Endothelial cell malignancies in infants, children and adolescents: treatment results of three Cooperative Weichteilsarkom Studiengruppe (CWS) trials and one registry. Pediatr Blood Cancer 67(3):e28095.
11. Koscielniak E, Sparber-Sauer M, Seitz G (2020) The Cooperative Weichteilsarkom Studiengruppe (CWS): successive multimodal studies for pediatric soft tissue sarcoma. Memo 13(4): 472-476.
12. Amoroso L, Castel V, Bisogno G (2020) Phase II results from a phase III study to assess the safety and efficacy of weekly nab-paclitaxel in paediatric patients with recurrent or refractory solid tumours. Eur J Cancer 135:89-97.
13. 1Florou V, Wilky BA (2021) Current Management of Angiosarcoma: Recent Advances and Lessons From the Past. Curr Treat Options Oncol 22(7):61.
14. 1Wagner MJ, Othus M, Patel SP (2021) Multicenter phase II trial (SWOG S1609, cohort 51) of ipilimumab and nivolumab in metastatic or unresectable angiosarcoma: a subset of dual anti-CTLA-4 and anti-PD-1 blockade in rare tumors (DART). J Immunother Cancer 9(8):e002990.
15. Rosenbaum E, Antonescu CR, Smith S (2022) Clinical, genomic, and transcriptomic correlates of response to immune checkpoint blockade-based therapy in a cohort of patients with angiosarcoma treated at a single center. J Immunother Cancer 10(4):e004149.