ONCOLOGY

TESTICULAR DIFFUSE LARGE B-CELL LYMPHOMA. CLINICAL LECTURE AND CASE REPORT

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ABSTRACT

Lymphoma is a heterogeneous group of lymphocyte malignancies that may involve lymphatic tissue, bone marrow, or extranodal sites. The lecture provides a brief overview of the current state of the problem of diagnosis and treatment of primary testicular lymphoma. Primary testicular lymphoma (PTL) is a rare lymphoid malignancy. Though it is rare, PTL is the most common type of testicular tumor in men over 60 years of age. The most common histological type is diffuse large B-cell lymphoma. To date, there are no well-documented etiological or risk factors for PTL. In contrast to other common testicular neoplasms, there was no statistically significant association of PTL with cryptorchidism, trauma, chronic orchitis, or infertility. Ultrasound is generally the first-line imaging method used to characterize testicular lesions. PTL manifests itself in the form of a hypoechoic formation, which can take the form of either a single large formation or multiple small formations that occupy most of the testicular parenchyma or completely replace it. Systemic treatment, including orchiectomy, chemotherapy, radiation therapy, and intrathecal prophylaxis, is necessary for all patients with PTL. In addition to achieving complete remission, the goal of PTL treatment is to prevent recurrences in the contralateral testis and central nervous system. The presented information is supplemented by our own observation and images. Personal medical data is published with the written consent of the patient. In our case, the patient's age was 38 years, which does not fall into the specified age group for primary testicular lymphoma. In our opinion, the publication of this clinical case and analysis of scientific literature on this topic are relevant.

Key words: *diffuse large B-cell lymphoma, primary testicular lymphoma, non-Hodgkin lymphoma*

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ДИФФУЗНАЯ КРУПНОКЛЕТОЧНАЯ В-КЛЕТОЧНАЯ ЛИМФОМА ЯИЧКА. КЛИНИЧЕСКАЯ ЛЕКЦИЯ И НАБЛЮДЕНИЕ ИЗ ПРАКТИКИ

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РЕЗЮМЕ

Лимфома представляет собой гетерогенную группу злокачественных новообразований лимфоцитов, которые могут вовлекать лимфатическую ткань, костный мозг или экстранодальные локализации. В лекции приводится краткий обзор современного состояния проблемы диагностики и лечения первичной лимфомы яичка. Первичная лимфома яичка (ПЛЯ) является редкой лимфоидной злокачественной опухолью. ПЛЯ, хотя и встречается редко, представляет собой наиболее распространённый вид опухоли яичка у мужчин старше 60 лет. Наиболее часто встречающимся гистологическим типом является диффузная крупноклеточная В-клеточная лимфома. На сегодняшний день нет хорошо задокументированных этиологических факторов или факторов риска ПЛЯ. В отличие от других распространённых новообразований яичка, не наблюдалось статистически значимой связи ПЛЯ с крипторхизмом, травмой, хроническим орхитом или бесплодием. Ультразвуковое исследование, как правило, является методом визуализации первой линии, используемым для характеристики поражений яичка. ПЛЯ проявляется в виде гипоэхогенного образования, которое может иметь вид как одиночного крупного образования, так и множественных мелких образований, занимающих большую часть паренхимы яичка или полностью её замещающих. Системное лечение, включая орхиэктомию, химиотерапию, лучевую терапию и интратекальную профилактику, необходимо для всех пациентов с ПЛЯ. Помимо достижения полной ремиссии, целью лечения ПЛЯ является предотвращение рецидивов в контралатеральное яичко и центральную нервную систему. Представленный материал дополнен собственным наблюдением и иллюстративным материалом. Персональные медицинские данные публикуются с письменного согласия пациента. В нашем случае возраст пациента составил 38 лет, что не попадает в указанную возрастную группу для первичной лимфомы яичка. На наш взгляд, публикация данного клинического случая и анализа научной литературы по данной теме является актуальной.

Ключевые слова: *диффузная крупноклеточная В-клеточная лимфома, первичная лимфома яичка, неходжкинская лимфома*

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Primary testicular lymphoma (PTL) is one of the rarest and most aggressive forms of lymphoproliferative neoplasia with primary tumor growth predominantly from extracerebral lymphoid tissue, characterized by a continuous process of recurrence and with a poor prognosis. The most common histotype of PTL is diffuse large B-cell lymphoma (DLBCL) [1]. A common clinical symptom of PTL is unilateral painless testicular swelling that develops over weeks, months or even years.

Lymphoproliferative neoplasias represent a heterogeneous group of diseases with common links of pathogenesis, which are subdivided into Hodgkin's and non-Hodgkin's lymphomas. Hodgkin lymphoma is characterized by the presence of specific changes (granulomas with large multinucleated Berezovsky – Sternberg cells) in lymph nodes against the background of a primary extracerebral tumour lesion of the lymphatic system; non-Hodgkin lymphoma includes all other primary extracerebral tumours of the lymphatic system, which are divided into T- and B-cell groups and a number of subgroups [2]. Primary testicular DLBCL initially occurs only in the testis and is not associated with lymphoma elsewhere or leukaemia. Testicular involvement with a background of systemic lymphoma/leukaemia is diagnosed as secondary testicular lymphoma. As PTL is rare, attempts to elucidate its clinical characteristics, prognostic outcomes mainly rely on case reports and analyses of a small cohort of patients, and unfortunately the data have not been properly analyzed at the large population level.

HISTORICAL AND EPIDEMIOLOGICAL BACKGROUND

In the scientific literature, the first mention of primary testicular lymphoma appeared in 1856 in a practical treatise on diseases of the testis, spermatic cord and scrotum published by the British surgeon Thomas Blizard Curling (1811–1888), who was renowned for his ability to treat testicular diseases [3]. PTL was later described by M. Malassez in his article published in 1877 in the French Bulletin of the Society of Pathology [4].

Non-Hodgkin's lymphoma (NHL) is among the most commonly diagnosed haematological malignancies worldwide, comprising almost 3 % of all cancer diagnoses, occurring predominantly in white males of European and Hispanic origin over 65 years of age [5]. According to the International Agency for Research on Cancer, approximately 414,772 new cases of NHL were diagnosed worldwide in 2015 [5]. The five-year survival rate for NHL is 72.0 and 86.6 % for Hodgkin's lymphoma. Nearly 21,000 people are expected to die from lymphoma in 2023, comprising 3.5 % of all cancer deaths. The mean age at diagnosis for patients with NHL is 67 years and the mean age at death is 76 years, with Hodgkin's lymphoma most commonly detected between the ages of 20 and 34 years, and as a result of the higher survival rate among younger patients, the mean age of death is 68 years [6]. The World Health Organization classification system defines more than 90 different subtypes [7]. NHL can occur in almost every organ [8]. Further classification of the individual lymphoma subtypes is beyond the scope of this article, but ultimately each is defined by morphology, immunophenotype, genetic, molecular and clinical features.

Primary testicular lymphoma is an extremely rare form of extranodal NHL, comprising 3–9 % of testicular malignancies and 1–2 % of NHL, and tends to recur haematogenously to the central nervous system, skin, lungs, pleura, Waldeyer's ring, soft tissues and eyes, sometimes concealing the primary localization of the focus [9]. PTL is the most common type of ectranodal lymphoma affecting the genitourinary system, with an incidence of 3.04 % (kidney lymphoma 0.22 %, bladder lymphoma 0.18 %, prostate lymphoma 0.01 %) [9]. The true incidence of PTL remains precisely unknown. Foreign literature confirms the rarity of PTL with an annual incidence of 0.09 to 0.26 per 100,000 people [10]. With a mean age of diagnosis ranging from 66 to 68 years, PTL is the most frequent malignant neoplasm in men over 60 years of age, with a progressively increasing risk of disease progression with age and frequent bilateral organ involvement (8–38 %) [10]. Diffuse large B-cell lymphoma is the most common subtype of lymphoma, including testicular localisation, and it represents 30 to 40 % of all new NHL diagnoses. DLBCL includes B-cell lymphomas of moderate to high malignancy with different molecular backgrounds, clinical course and response to treatment. Up to one-third of DLBCLs have extranodal localization, most commonly the gastrointestinal tract, skin and soft tissues, bones and genitourinary organs [10]. With primary testicular lymphoma, sporadic cases (Burkitt's lymphoma, lymphoblastic lymphoma, plasmacytoma, T-cell lymphoma) of other lymphoma varieties have been described in the scientific literature [11]. Up to 90 % of DLBCLs are diagnosed at stage 1 and 2 [12].

Testicular DLBCL often infiltrates the epididymis, the spermatic cord, and retroperitoneal lymph nodes. Along with a tendency to affect the contralateral testis, the process may spread to the central nervous system (CNS), as well as to other extranodal sites: skin, lungs, kidneys, adrenal glands, gastrointestinal tract, etc. [13]. Recurrence of testicular DLBCL in the CNS occurs in 5 % of patients [14]. Twenty-five percent of patients with DLBCL have secondary spread to the heart [15, 16].

PATHOGENESIS, MOLECULAR CHARACTERISTICS OF TESTICULAR DIFFUSE LARGE B-CELL LYMPHOMA AND RISK FACTORS

PTL etiology is currently not precisely defined and remains poorly studied. To this day, there is still debate about the factors that contribute to the development of this disease. Genetic predisposition is of some importance, and infectious and inflammatory factors also increase the risk of lymphoma formation.

First-degree relatives of patients with NHL and Hodgkin's lymphoma have an increased risk of developing lym-

phoma, by a factor of 1.7 and 3.1, respectively. A family history of a particular lymphoma subtype is associated with the development of the same subtype [6]. Three principal mechanisms exist whereby infection increases lymphoma risk: direct lymphocyte transformation, immunosuppression, and chronic antigenic stimulation [6]. Rheumatoid arthritis, systemic lupus erythematosus, Sjogren's syndrome, dermatomyositis, and celiac disease (gluten disease) are inflammatory conditions that increase the risk of developing lymphoma due to disease-specific causes and continuous intake of immunosuppressant drugs [6]. Modifiable risk factors include tobacco use and obesity (body mass index – 30 kg/m^2 or higher). Implants and prolonged exposure to pesticides are also associated with NHL [6]. HIV infection is a recognized risk factor for aggressive and primary extranodal lymphomas and is the only well-described etiologic factor for testicular DLBCL.

Testicular DLBCL is a B-cell malignancy in which normal B-cell development and differentiation are impaired. The use of cytogenetics, fluorescence *in situ* hybridization, and comparative genomic array hybridization has shown that genetic alterations in primary testicular DLBCL often include complex abnormalities such as translocation, trisomy, amplification, and deletion. Abnormalities of 3q27 and 6q deletion are the most frequently observed; the latter may be the only cytogenetic abnormality [17].

The DLBCL microenvironment plays an important role in the pathogenesis of PTL and prognosis of the disease [18]. Over the last decades, neutrophils have been shown to contribute to tumour progression, including PTL [19]. Several mechanisms have been identified suggesting a role for neutrophils in the high probability of progression. The secretion of various cytokines such as interleukin 2, interleukin 10 and high immature cell content constitutes one of them [20]. Conversely, elevated neutrophil counts are associated with potent antitumour effector cells, especially in patients with lymphoma [21]. T-lymphocytes, mainly consisting of CD4$^+$ and CD8$^+$ T-cells, play an important role in cell-mediated immunity. A small amount of tumour infiltrating CD4$^+$- and CD8$^+$ T-cells has shown in scientific studies to be associated with poor prognosis in patients with PTL (increased risk of progression and death) [22].

Primary testicular DLBCL develops in an immunoprivileged site behind the hemato-testicular barrier and has a molecular profile very similar to primary CNS lymphoma, including mutations MYD88^{L265P} (70–80 %), CD79B and CDKN2A (88 %), as well as changes in PD-1/PD-2 loci (50 %) [23]. ABC phenotype and MCD genomic subtype are found in most clinical cases [24].

The World Health Organization (WHO) defines DVCCL as a tumour of large to medium-sized B-lymphocytes with a nucleus size comparable to or larger than that of a normal macrophage or twice the size of a normal lymphocyte. The features of DLBCL include diffuse growth of tumor cells with infiltration of lymph nodes and/or non-lymphatic organs and tissues by large lymphoid B-cells. DLBCL is morphologically characterized by diffuse infiltration of medium to large sized cells with large nuclei and abundant cytoplasm, which destroy and obliterate the basic architecture of the affected lymphatic tissue. The cells typically express pan-B-cell antigens (CD19, CD20, CD22, CD79a and CD45). Most cells also express surface immunoglobulin. Approximately 14 % of lymphomas express CD30, which may indicate a favourable prognosis [25].

CLINICAL SIGNS

PTL has no specific clinical signs. The most common clinical symptom of PTL is uni- or bilateral oedema of the testis (scrotum) that develops over a long period of time (weeks, months and even years), usually painless [13]. Bilateral testicular oedema is observed in 35 % of patients with PTL [13]. PTL is associated with the development of hydrocele in 40 % of cases, and urologists are the first consultants that patients refer to. In some cases, PTL may initially manifest with the onset of sharp pain in the testicle. In addition to an increase in testicular size, systemic manifestations such as fever, anorexia, night sweats and weight loss may join, which occurs in 25–41 % of patients [13]. During the course of the disease, local spread of the process to the testicular appendages, the spermatic cord and scrotal skin, and regional retroperitoneal lymph nodes often develops [13].

DIAGNOSIS AND TREATMENT

Ultrasound examination (ultrasound) continues to be the most widely used method of imaging testicular neoplasms. As a rule, testicular DLBCL is characterized by local or diffuse "hypervascularization" on color Doppler ultrasound. It has been suggested that if colour Doppler scrotal imaging reveals hypervascularization in patients with complaints of painless scrotal oedema, testicular lymphoma/leukaemia should be considered as a differential diagnosis [26]. The mean PTL size at primary ultrasound is 5.0 cm (interquartile range 4.1–7.1 cm) [13].

Since PTLs represent a subtype of diffuse large B-cell lymphoma that is fluorodeoxyglucose-dependent, positron emission tomography-computed tomography (PET-CT) should be used to determine the extent of the lesion. Bone marrow biopsy is only required in DLBCL, in cases of discordant histological picture and in negative PET-CT results. Unfortunately, PET-CT opportunities do not allow detecting CNS lesions, as it naturally absorbs fluorodeoxyglucose; therefore, magnetic resonance imaging of the brain and lumbar puncture followed by cytology and flow cytometry are recommended to exclude CNS lesions [27]. CNS involvement (cerebral membranes, epidural space and brain parenchyma) in testicular DLBCL almost always leads to unfavourable outcomes with a median survival after diagnosis of CNS involvement of only 2–5 months [27].

Apart from achieving complete remission, treatment of primary testicular DLBCL is essentially aimed at achieving both local and systemic control of the disease, as well as preventing possible recurrence to the contralateral testis and CNS. No randomised phase III studies have been conducted since the disease is rare, and the international-

ly accepted standard of care for testicular DLBCL is based on evidence from a retrospective analysis of case series and phase II studies [28].

Nowadays, at the time of diagnosis, a patient with primary DLBCL should be offered a multimodal treatment approach including surgery in the volume of uni- or bilateral orchofunicollectomy, combined anthracycline-based chemotherapy, prophylactic intrathecal chemotherapy and craniomoshono irradiation. Orchiectomy is the main and obligatory initial method of treatment and diagnosis in all patients irrespective of the stage of the cancer process, providing morphological verification of the diagnosis, followed by cytological, histological, immunohistochemical and karyological studies of the removed testis. Furthermore, it should be considered that the persistence of the blood-testis barrier prevents the testicular tumour from being exposed to chemotherapeutic drugs, and testicular tumour cells may also express high levels of drug-resistant proteins, which also contribute to the development of resistance to chemotherapy.

Testicular DLBCL is an extremely aggressive malignancy with low overall survival and progression-free survival: 5-year progression-free survival and 5-year overall survival are 35.4 % (95% confidence interval (95% CI): 14.8–56.0 %) and 53.4 % (95% CI: 30.1–76.7 %), respectively [13]. The prognosis for testicular DLBCL is unfavorable, especially if disease dissemination occurs within the first year after diagnosis [29]. Improved survival rates (overall survival up to 85 %, progression-free survival up to 74 %) can be achieved in patients with local/limited stage primary testicular DLBCL using anthracycline-containing chemotherapy in combination with rituximab, prophylactic contralateral scrotal radiotherapy and prophylactic intrathecal chemotherapy [30]. Although there are studies that have not demonstrated improved survival in patients with testicular DLBCL [31], nevertheless, several studies have confirmed, that the addition of rituximab (375 mg/m^2) to chemotherapy according to R-CHOP regimens (cyclophosphamide 750 mg/m^2, doxorubicin 50 mg/m ^{2}, vincristine 1.4 mg/m^2, prednisone 100 mg) leads to a significant reduction in CNS relapses during PTL [32, 33]. Local/limited stage (I and II) of the process according to the international classification of Ann Arbor (1971), performance of chemotherapy after orchiectomy, and a low international prognostic index score (less than 2) are independent factors correlating with increased survival of patients with testicular DLBCL [13].

If contralateral testicular irradiation is not performed, the risk of PTL recurrence is 42 % within 15 years [34]. Numerous scientific studies have convincingly demonstrated that the absence of prophylactic contralateral irradiation is a poor predictor of prognosis [35, 36]. Whether preventive contralateral orchiectomy should be performed remains to be studied.

By using chemotherapy containing high doses of methotrexate, the risk of relapse in the CNS can be reduced [37]. High doses of methotrexate, however, comprise a resource-intensive therapy with significant toxicity, so it should be administered only to patients at high risk of CNS lesion recurrence. Rituximab improves survival but does not reduce CNS relapse rates [37].

With a view to forming experience and structuring medical knowledge among specialists involved in the treatment of urological patients, we present a clinical observation – a case of primary testicular DVCCL treated according to the SCARE (Surgical CAse REport) 2020 recommendations [38].

Patient T. born in 1984 (38 years old) came to our clinic on September 9, 2022 with the main complaint of painless enlargement of the right testicle in volume. He considered himself diseased for a year, when he discovered a change in the size of the scrotum on the right side; he was treated by an urologist at his place of residence with suspected orchoepididymitis, and took antibiotics. No effect of the treatment was observed, the right testicle continued to increase in size.

At the initial examination, the skin of the external genitalia is unchanged, pale pink in colour, wrinkled, without pathological inclusions (Fig. 1). The scrotum is asymmetrical in shape, enlarged in size on the right side; superficial palpation of the scrotal organs on the right side reveals a painless dense elastic mass measuring 4 × 6 cm. The testis is enlarged in size, ovoid in shape, dense-elastic, smooth in consistency, no free fluid is detected during deep testicular palpation on the right side. The testis on the left is elastic, of soft-elastic consistency, smooth. The testicular appendage is symmetrically located on both sides, soft in consistency, with no additional inclusions. The elements of the spermatic cord are palpated in the form of a round dense, freely displaceable mass, pathologic inclusions are not palpated. The veins of the spermatic cord are not dilated. Examination and palpation of the penis, inguinal region, lower abdomen and perineum revealed no peculiarities.

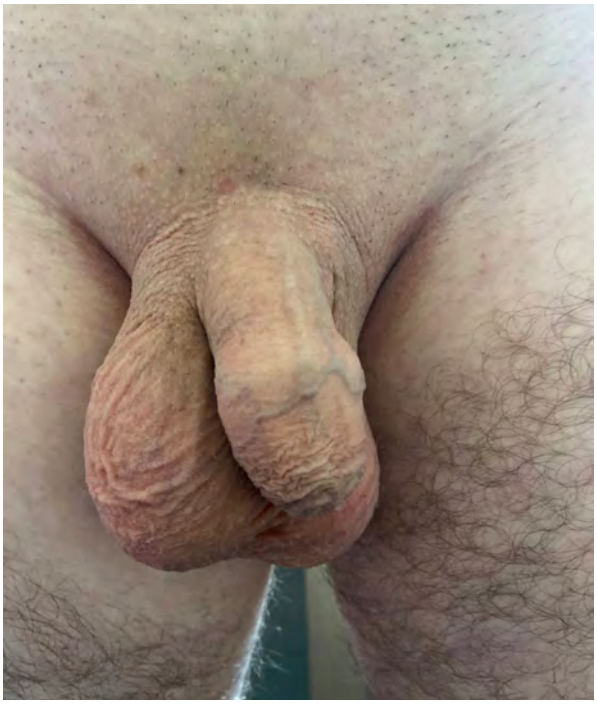


FIG. 1.
Patient T. External genital appearance

An ultrasound examination of the scrotal organs was performed at an appointment with a urologist: a voluminous hypoechogenic mass of the right testicle, occupying ¾ of the organ, was revealed. The size of the right testicle is 36.7 cm^3, with clear contours. Doppler reveals diffuse hypervascularisation of the right testis. No changes were found in the contralateral testis. Laboratory findings, including testicular tumor markers, were within reference values. Endoscopic examination of the upper and lower gastrointestinal tract revealed no pathology. On October 13, 2022, an ultrasound examination of the veins of the lower extremities was performed: no pathology was revealed.

A native high-resolution multi-layer spiral computed tomography of the chest, abdomen, and pelvic organs with primary collimation of 64 × 0.6 mm, slice reformat thickness of 1.0–5.0 mm, and subsequent 3D image analysis was performed on October 12, 2022 (Fig. 2). In the scan area, the right testis is enlarged in size (56 × 43 mm), inhomogeneous structure (up to 14–33 HU). No other pathological findings were observed. A preliminary diagnosis was determined following the above-mentioned findings: Malignant neoplasm of the right testicle of the 1a clinical group (C62.2).

In the first stage on October 27, 2022, the patient underwent radical right-sided orchofuniculectomy with high ligation of the seminal vein under general anaesthesia (Fig. 3).

Macroscopically, the right testicular tumour which was excised as a solid, homogeneous grey-white mass with a lobular appearance, replacing the testis completely, not adherent to the surrounding tissues (Fig. 4). Twelve months have elapsed since the initial medical treatment and verification of the diagnosis.

According to the results of histological examination dated November 15, 2022, the microdrugs of the excised tumour of the right testis revealed diffuse growth of non-Hodgkin lymphoma from large and medium-sized cells. The tumour of the right testis was formed by large lymphoid

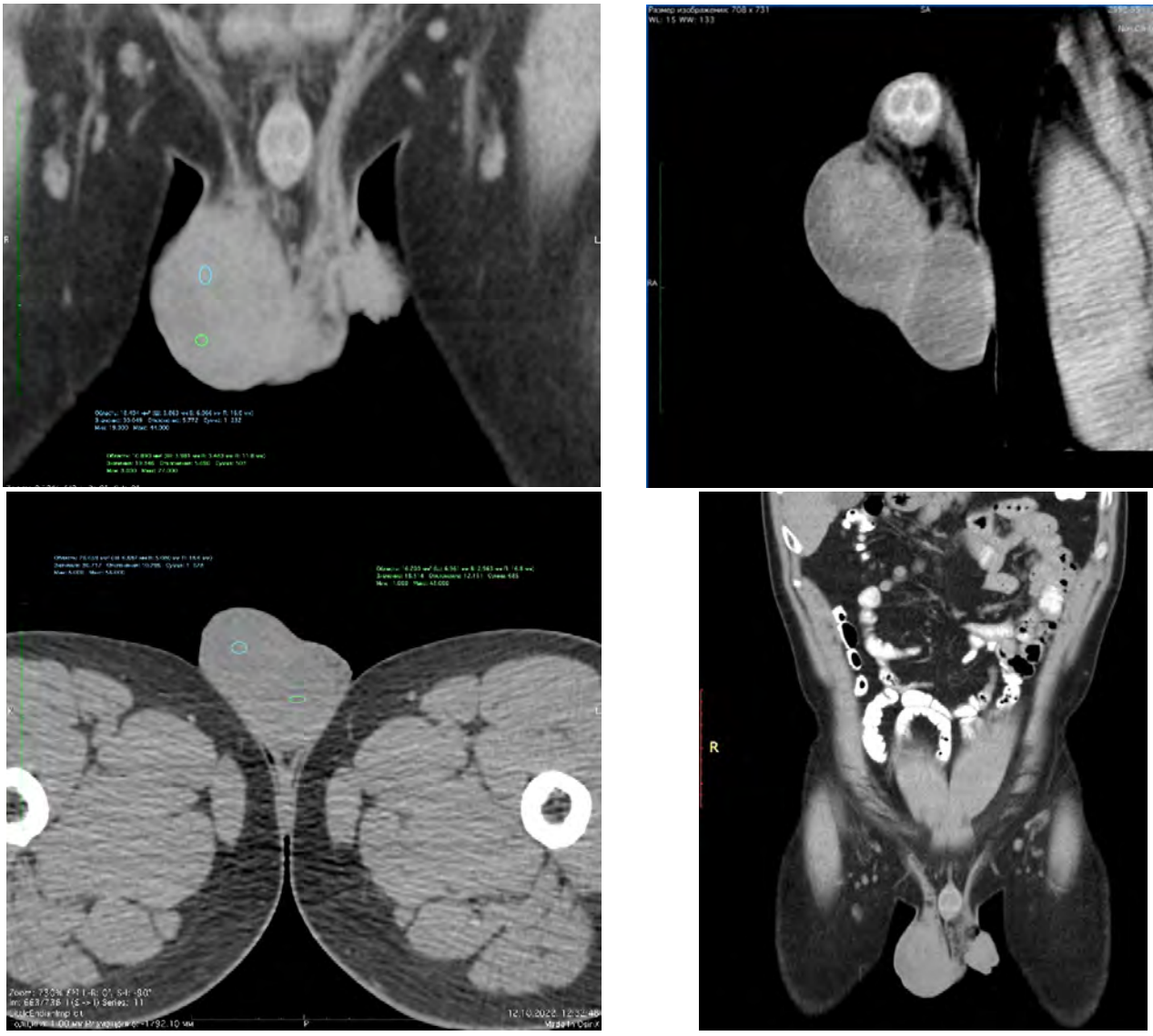


FIG. 2.

Patient T. Primary testicular diffuse large B-cell lymphoma of the testis. Contrast-enhanced computed tomography: enlarged right testis (56 × 43 mm)

cells, the diameter of which exceeded the size of a small lymphocyte by 4–5 times, with a diffuse growth pattern. Morphologically, the predominant cell population was centroblasts characterised by a vesicular chromatin structure, 2–4 nuclei located near the nuclear membrane and moderately developed amphophilic cytoplasm (Fig. 5).

Additionally, an immunohistochemical study of the right testicular tumor was performed (November 17, 2022) immunohistochemical study of the right testicular tumor on Bond-maX immunohistostainer (Leica Microsystems, Germany) using a panel of Novocastra/Leica antibodies to CD20 (L26 clone), CD3 (LN10 clone), CD10 (56C6 clone), CD5 (4C7 clone), Cyclin D1 (D1-GM), CD23 (1B12 clone), bcl-6 (LN22 clone), MUM1 (MuM1p clone) and Ki-67 (MM1 clone). The immunophenotype of the lymphoma was represented by expression of pan-B-cell antigen CD20 as well as CD23,

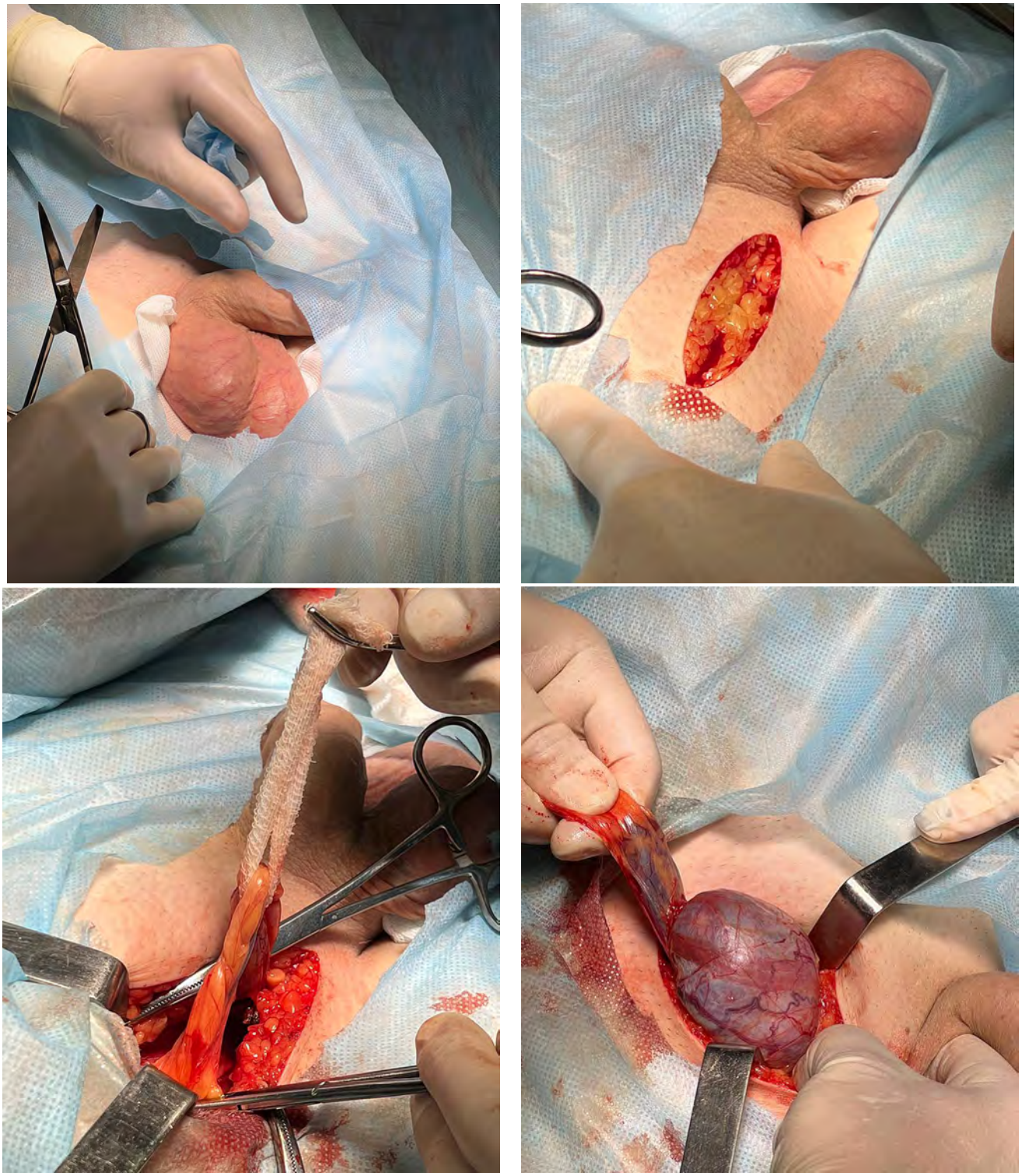


FIG. 3.
Patient T. Intraoperative images: right-side radical inguinal orchiofuniculectomy

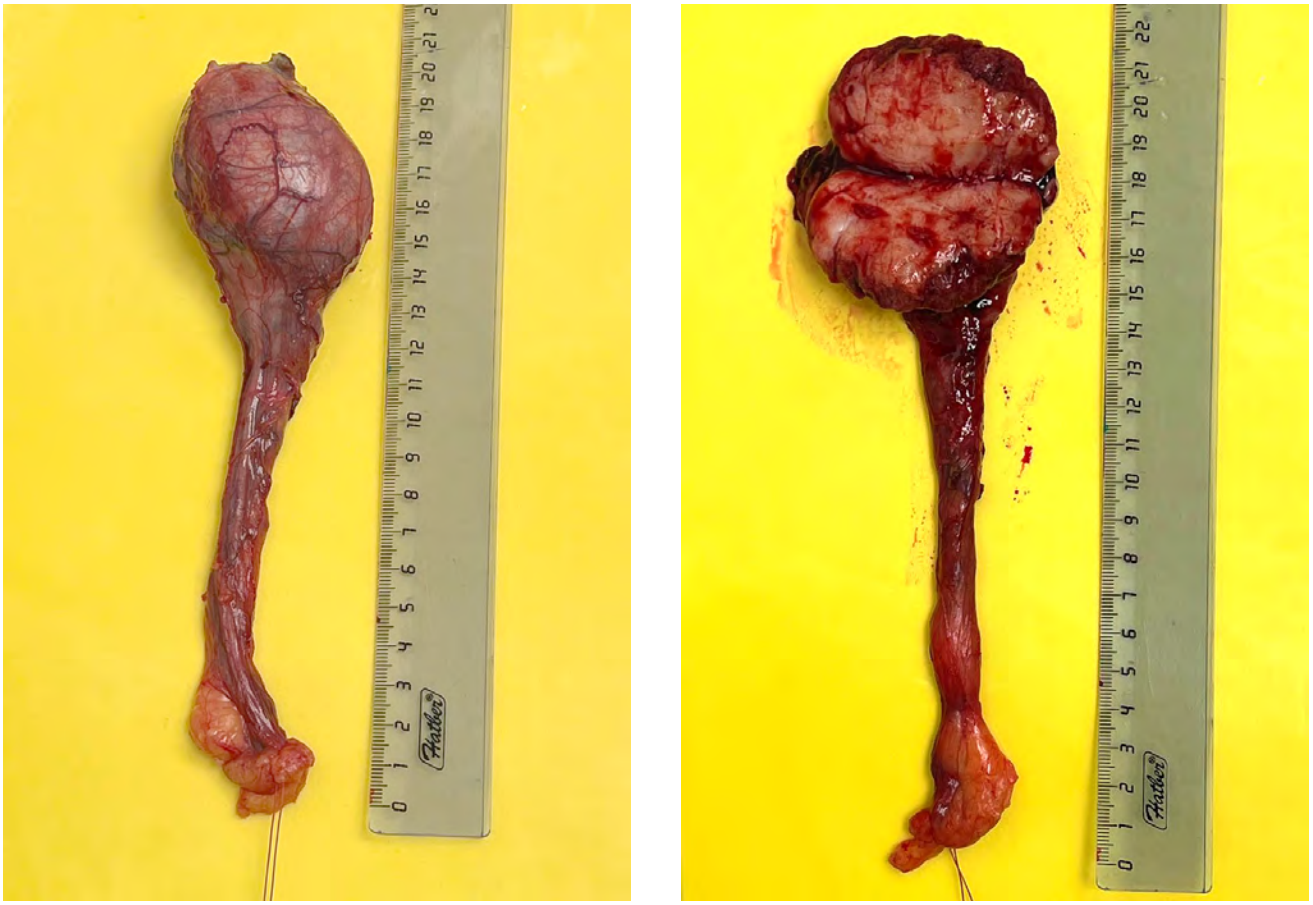


FIG. 4.
Patient T. Primary testicular diffuse large B-cell lymphoma of the testis: macroscopic preparation

bcl-6 and MUM1 and absence of expression of the rest of the above antigens. The proliferative activity of the tumour by Ki-67 expression was about 80 %. The tumour cells were characterized by the following immunophenotype: $CD20^+$, $CD3^-$, $CD10^-$, $CD5^-$, cyclin $D1^-$, $CD23^+$, $bcl\text{-}6^+$, $MUM1^+$ and $Ki\text{-}67^+$ (about 80 %). Considering the histological picture and immunohistochemical findings, the right testicular neoplasm was classified as a diffuse large B-cell lymphoma of non-germ cell origin (activated cells).

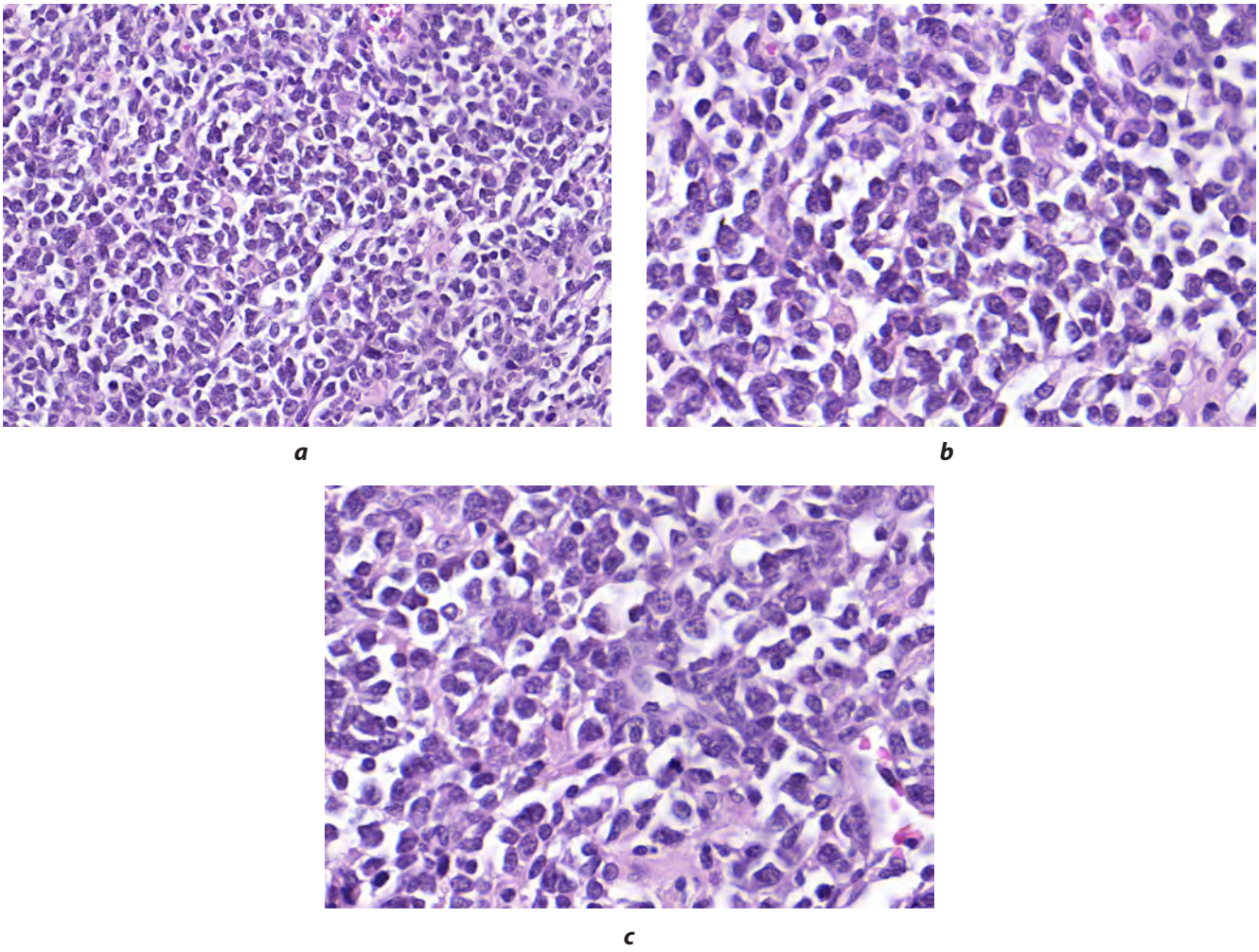
Postoperative period (day 3) was complicated by left lower lobe infarction-pneumonia S 7/8/DN0 (according to Clavien – Dindo 1 scale), with clinical manifestations (confirmed on the basis of laboratory and instrumental examinations), as a result of acute phlebothrombosis of the popliteal tibial segment on the left and peripheral left-sided pulmonary artery thromboembolism. Conservative treatment was received in the department of vascular surgery; he was discharged with improvement in satisfactory condition to continue treatment of the underlying disease.

Primary diagnosis: diffuse large B-cell lymphoma, non-GCB type, with right testicular involvement (C83.3). IE stage. Status post orchofuniculectomy on the right; palliative chemotherapy (1 course of R-CHOP regimen), clinical group II. Morphological conclusion: diffuse large B-cell lymphoma, non-GCB type, $CD20^+$, $CD23^+$, $bcl\text{-}6^+$, $MUM1^+$, proliferative activity index Ki-67 = 80 %. Status post right-sided radical inguinal orchofuniculectomy. Complication: acute phlebothrombosis of the popliteal tibial segment on the left (I80.2). Peripheral left-sided pulmonary artery thromboembolism (I26.9). Left-sided lower lobe infarction pneumonia S 7/8/DN0 (J18.8).

Systemic chemotherapy according to the R-CHOP scheme is planned as the second stage after a radically removed primary lesion. No invasion to other localisations was observed within 3 months following diagnosis.

CONCLUSION

Primary testicular DLBCL is a unique form of aggressive B-cell lymphoma with a characteristic genetic profile. The submitted clinical case of primary testicular DLBCL convincingly demonstrates that the tumour occurs not only in men after 60 years of age, but also at an earlier age; it indicates the importance of pathomorphological diagnosis and the use of additional immunohistochemical methods of investigation for the accurate diagnosis and differential diagnosis. However, physical assessment of the external genitalia continues to be the most important step in the diagnosis of urological diseases. Since there are no standardized protocols for the management of patients with prima-



a ***b*** ***c***

FIG. 5.

*Patient T. Primary testicular diffuse large B-cell lymphoma of the testis. Histological examination: the image demonstrates a testicular tumour consisting of diffuse layers and discrete medium to large sized atypical cells with pale eosinophilic or clear cytoplasm. The predominant cell population is centroblasts characterised by a vesicular chromatin structure, 2–4 nuclei located near the nuclear membrane and a moderately developed amphophilic cytoplasm. Hematoxylin and eosin staining; magnification ×200 (**a**), ×400 (**b**, **c**)*

ry testicular lymphoma, it is essential that these clinical cases continue to be analyzed and discussed in routine urological practice.

The treatment evolution of primary testicular DLBCL during the last decade is an excellent example of successful translational studies, through which a better understanding of the pathogenesis of the disease has contributed to the development of the most effective treatments. Recurrence to the central nervous system remains a serious problem, however, and future studies should focus on determining the best treatment strategy to reduce the risk of its occurrence.

Conflict of interest

The authors of this article declare no conflicts of interest.

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