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Case Report / Приказ болесника

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SUMMARY

Introduction Small lymphocytic lymphoma/chronic lymphocytic leukemia (SLL/CLL) is an indolent lymphoproliferative disorder characterized by accumulation of mature but dysfunctional B lymphocytes. Aortic complications have been occasionally reported in lymphoma, most often in aggressive subtypes, while they are extremely rare in SLL/CLL. The aim of this report was to present a case of recently developed ruptured abdominal aortic aneurysm in a patient with SLL and its successful hybrid endovascular management.

Case outline A 58-year-old male with SLL/CLL presented with lower back and right flank pain. Initial CT demonstrated marked progression of lymphadenopathy and interval enlargement of the infrarenal aortic diameter compared to prior imaging, remaining below the aneurysmal threshold. Due to persistent symptoms and elevated inflammatory markers, further imaging was performed. MRI of the lumbosacral spine and subsequent CT angiography revealed a newly developed saccular aneurysm of the infrarenal abdominal aorta with retroperitoneal hematoma and surrounding lymph node conglomerates. The patient underwent urgent endovascular repair using an aorto-uni-iliac stent graft with contralateral iliac occlusion, combined with femoro-femoral crossover bypass. Postprocedural imaging confirmed successful exclusion of the lesion without endoleak.

Conclusion This case highlights a rare vascular complication of SLL/CLL and suggests a possible role of lymphomatous infiltration and inflammation in aortic wall weakening. Hybrid endovascular treatment represents an effective therapeutic option.

Keywords: chronic lymphocytic leukemia; small lymphocytic lymphoma; abdominal aortic aneurysm; endovascular procedure

САЖЕТАК

Увод Б-ситноћелијски нон-Хочкин лимфом/хронична лимфоцитна леукемија (СЛЛ/ЦЛЛ) представљају индолентни лимфопролиферативни поремећај који карактеришу накупљање зрелих, али дисфункционалних Б лимфоцита. У литератури се повремено наводе аортне компликације код лимфома, претежно у агресивнијим подтиповима, док су код СЛЛ/ЦЛЛ изузетно ретке. Циљ овог рада је да се прикаже руптура новонастале анеуризме абдоминалне аорте код болесника са СЛЛ и њено успешно лечење хибридном ендоваскуларном техником.

Приказ болесника Болесник стар 58 година са историјом СЛЛ/ЦЛЛ јавио се због бола у доњем делу леђа и десној лумбалној ложи. Иницијални преглед компјутеризованом томографијом (ЦТ) показао је значајну прогресију лимфаденопатије у односу на претходни преглед, као и повећање дијаметра инфрареналног сегмента абдоминалне аорте, али без остварених критеријума за анеуризматско проширење. Због перзиситрајућег бола и повишених параметара инфламације начињени су додатни радиолошки прегледи. Магнетно-резонантни преглед лумбосакралне кичме и накнадно начињена ЦТ ангиографија открили су новоформирано сакуларно анеуризматско проширење инфрареналног сегмента абдоминалне аорте са ретроперитонеалним хематомом и локорегионалним ретроперитонеалним конгломератима лимфних чворова. Болесник је хитно збринут хибридним ендоваскуларним третманом, пласирањем *аорто-уни-илијак* стент-грата са контралатералном оклузијом илијачне артерије, у комбинацији са феморофеморалним бупасс-ом. Контролна ЦТ ангиографија потврдила је успешно искључење анеуризме из циркулације, без знакова ендолеака.

Закључак Овај случај истиче ретку васкуларну компликацију код болесника са СЛЛ/ЦЛЛ и сугерише да лимфомска инфилтрација и инфламација могу допринети слабљењу зида аорте. Хибридно ендоваскуларно лечење представља ефикасну терапијску опцију.

Кључе речи: хронична лимфоцитна леукемија; б-ситноћелијски нон-хочкин лимфом; анеуризма абдоминалне аорте; ендоваскуларна процедура

INTRODUCTION

Small lymphocytic lymphoma (SLL)/chronic lymphocytic leukemia (CLL) represent an indolent (slow-growing) lymphoproliferative disorder characterized by the accumulation of morphologically mature but immunologically dysfunctional B-lymphocytes in lymph nodes, bone marrow, and blood [1, 2]. These two entities are considered different clinical manifestations of the same disease. In SLL, malignant cells are predominantly found in lymph nodes, while in CLL they primarily involve the peripheral blood and bone marrow. Together, CLL/SLL belongs to the group of non-Hodgkin lymphomas.

Given the normal distribution of lymph nodes along the aorta, paraaortic nodal involvement may occur in CLL due to lymphomatous infiltration, which may even extend to involve the adjacent aortic wall, presenting as periaortic lymphoma. Such infiltration may lead to structural weakening of the aortic wall and aneurysm formation [3, 4]. Aortic involvement presenting as aneurysm, rupture, or dissection has been reported in the literature, most often in association with high-grade lymphomas, typically diffuse large B-cell lymphoma, whereas reports of similar aortic complications associated with indolent B-cell lymphomas, such as SLL/CLL, are extremely rare. Reports describing endovascular management of lymphoma-related aortic complications are even less common.

The aim of this report was to describe the successful hybrid endovascular management of a ruptured abdominal aortic aneurysm in a patient with SLL and to discuss possible pathogenetic links between lymphoproliferative disease and aortic wall weakening.

CASE REPORT

A 58-year-old man presented with a four-day history of pain in the lower back and right flank, radiating downward. He denied fever or urinary symptoms. The patient has a history of chronic lymphocytic leukemia/small lymphocytic lymphoma (CLL/SLL), diagnosed in 2021, and underwent six cycles of treatment *Gazyva* - *Chlorambucil* from June 2023 to July 2024. Follow-up with a hematologist has been irregular despite recommendations. He denied B symptoms. His medical history was notable for chronic arterial hypertension, myocardial infarction in 2021, and renal colic on the right side, also in 2021. On physical examination, the patient was hemodynamically stable and cardiopulmonary compensated, with mild hypertension (145/85 mmHg) and normal heart rate. Enlarged regional lymph nodes were palpable: cervical and axillary bilaterally, measuring up to 2 cm, and inguinal bilaterally, measuring up to 2.5 cm. The liver was enlarged, while the spleen was not palpable. Laboratory tests revealed leukocytosis with lymphocytosis (WBC 33.07 × 10^9/L, lymphocytes 17.40 × 10^9/L), without anemia or thrombocytopenia, and normal renal and liver function. Marked elevation of inflammatory markers was also noted (CRP 197.5 mg/L).

The initial CT scan, compared with a study from 18 months earlier, showed enlargement of the liver and spleen. There was a marked increase in intra-abdominal (both intra- and retroperitoneal), pelvic, and inguinal lymphadenopathy compared with the previous scan. The largest lymph nodes were located retroperitoneally and formed conglomerates measuring approximately 6.5 × 5 cm, with free fluid and stranding of the surrounding fat consistent with inflammation. Additionally, the infrarenal segment of the abdominal aorta, although non-aneurysmal dilated, showed an increase in luminal diameter from 18 mm on the prior study to 23 mm on the current examination (Figure 1).

Due to progression on CT imaging and abnormal laboratory findings, hospitalization was indicated, and parenteral antibiotic therapy was initiated, along with analgesic, symptomatic, and supportive treatment. After one week of severe back pain and elevated inflammatory markers despite ongoing therapy, spondylodiscitis was suspected, and an MRI of the lumbosacral spine was performed. The examination revealed a highly suspicious focal saccular aneurysmal dilatation along the right contour of the infrarenal abdominal aorta, measuring approximately 41 × 30 mm, accompanied by locoregional conglomerates of lymph nodes. No changes were observed in the vertebral bodies suggestive of viable tissue or active infiltration by the underlying disease (Figure 2).

CT angiography of the aortoiliac segment, performed the following day, revealed a saccular aneurysm along the right wall of the infrarenal abdominal aorta, measuring approximately 4.2 x 2.7 cm in diameter, accompanied by a retroperitoneal hematoma and conglomerates of enlarged lymph nodes surrounding the lesion. Free fluid was also observed in the retroperitoneal space (Figure 3).

After consultation with the multidisciplinary team, the patient was considered eligible for an endovascular procedure - endovascular aortic stent graft (EVAR), employing an aortic uni-graft configuration (*Medtronic Endurant II AUI* with right iliac extension) with contralateral (left) common iliac artery occlusion (plug), in combination with a hybrid surgical femoro-femoral crossover bypass (Figure 4). Given the presence of lymphadenopathy, excisional biopsy of a right inguinal lymph node, performed by a vascular surgeon, demonstrated no evidence of disease transformation, confirming the persistence of small lymphocytic lymphoma.

Follow-up CT performed 24 hours after the procedure demonstrated persistent periaortic hematoma and lymph node conglomerates, with no evidence of contrast extravasation.

Postprocedurally, the left common and external iliac arteries were occluded, while flow was maintained in the right common and external iliac arteries (Figure 5), as well as in the femoro-femoral crossover bypass and the left femoral artery. A second follow-up CT scan performed one month later showed no significant changes - persistent periaortic hematoma and adjacent lymph node conglomerates, and no evidence of endoleak.

Ethics: Ethical approval for this study was obtained from the institutional ethics committee (No. 6 00-43/9, date: April 2, 2026).

DISCUSSION

Abdominal aortic aneurysm (AAA) is defined as a localized dilatation of the abdominal aorta, typically diagnosed on imaging when the maximum aortic diameter measures ≥30 mm [5]. Several pathophysiological mechanisms have been described in the literature as playing a role in the development of AAA. These mechanisms include aortic wall inflammation, elastin degradation, oxidative stress, phenotypic changes and dysfunction of smooth muscle cells, and breakdown of the extracellular matrix [6]. Chronic inflammation and immune cell activation play a central role in the development of aneurysms, although the mechanisms governing their recruitment and activation remain incompletely understood [7]. In SLL/CLL, there is a marked accumulation of clonal B lymphocytes in the blood, bone marrow, and lymphoid tissues, reflecting both increased proliferation and impaired apoptosis. B cells play an active role in the pathogenesis of AAA as they accumulate in the adventitia, promote inflammatory responses and immunoglobulin deposition, interact with macrophages, and enhance the expression of matrix metalloproteinase-9 (MMP-9), an enzyme involved in extracellular matrix degradation

[7]. Interventions targeting B cells, such as anti-CD20 or BAFF receptor blockade, reduce AAA development and inflammation, demonstrating that B cell activity directly drives disease progression [8]. Although mechanisms linking B cells to AAA development have been described, and SLL/CLL is characterized by elevated counts of mature B-lymphocytes, no study to date has directly investigated the relationship between these two conditions. Moreover, retroperitoneal lymphoma can form periaortic infiltrates, which may mechanically compromise the aortic wall, trigger localized inflammatory responses, and lead to aneurysm formation.

In the literature, individual cases of patients with coexisting AAA and more aggressive forms of lymphoma are reported, whereas our patient has an indolent form of the disease. Some authors have reported that distinguishing periaortic lymphoma from a ruptured AAA is challenging due to overlapping clinical features and imaging findings, particularly when the aneurysm and tumor are in close proximity [9, 10]. Because both conditions may present with mass lesions around the abdominal aorta extending into the retroperitoneum, differentiating them based solely on imaging studies is often difficult. Abdominal pain in AAA associated with periaortic malignant lymphoma may result from infiltration of lymphoma cells into the aortic wall, causing rapid aneurysmal expansion, and can persist even after treatment of the AAA [11]. Cases linking SLL/CLL to aortic wall damage are exceedingly rare, as reported in a case of thoracic aortic dissection associated with this type of lymphoma, which raises the possibility that even the indolent form of the disease may lead to severe vascular complications [3].

The development of AAA is shaped not only by underlying pathophysiological mechanisms but also by demographic, lifestyle, and clinical risk factors. The main recognized risk factors for abdominal aortic aneurysm (AAA) are advanced age, male gender, history of smoking, coronary heart disease, hypertension, peripheral artery disease, previous myocardial infarction,

and a family history of AAA [12, 13]. Our patient is a 58-year-old male with a history of hypertension and prior myocardial infarction, and a smoking habit, representing multiple established risk factors for abdominal aortic aneurysm.

After multidisciplinary team review, an endovascular approach was chosen, as patients with lymphoma are generally not managed with open surgery due to the high risk of postprocedural complications. Retroperitoneal dissection could result in bleeding from enlarged lymph nodes that would be difficult to control, and access to the aneurysm neck would also be impeded by their bulk. The literature also suggests that, in such patients, EVAR is preferred over conventional aortic replacement [11]. According to standard protocol for aorto-uni-iliac EVAR, occlusion of the contralateral common iliac artery is performed to prevent endoleak type II, specifically by eliminating potential retrograde flow through internal iliac artery collaterals. This approach is considered routine in this procedure, as it significantly reduces the risk of endoleak. Additionally, following the endovascular procedure, a femoro-femoral bypass was created by a vascular surgeon as a standard adjunct after deployment of an aorto-uni-iliac (AUI) stent graft, in accordance with the guidelines of the European Society for Vascular Surgery [14].

Endovascular treatment of abdominal aortic aneurysm is minimally invasive and considered the preferred approach for patients with relevant comorbidities, as illustrated in our patient with SLL/CLL.

Conflict of interest: None declared.

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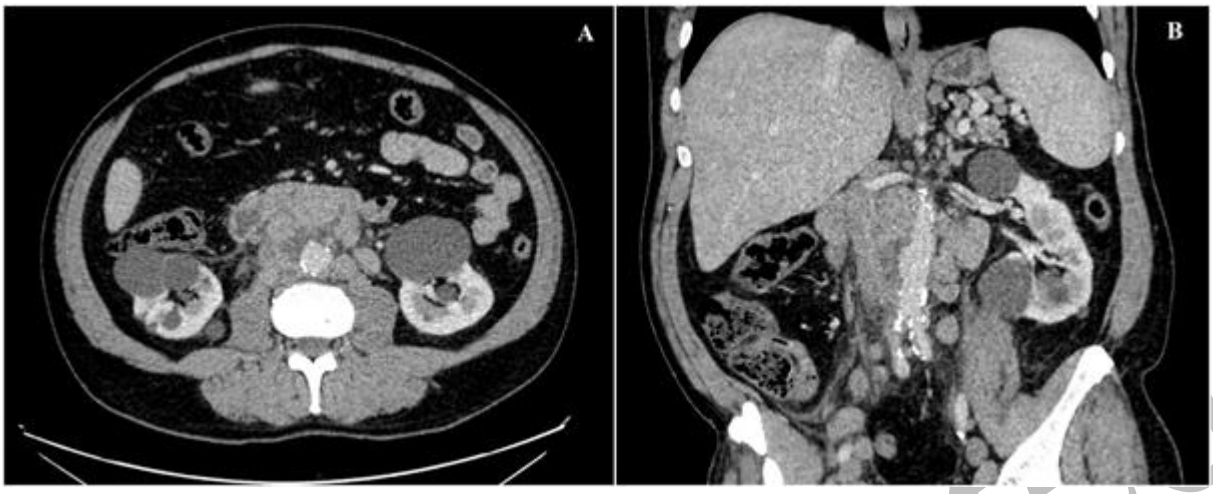

Figure 1. Initial contrast-enhanced computed tomography examination of the abdomen: A – axial image; B – coronal image; a conglomerate of enlarged lymph nodes is observed in the periaortic and retroperitoneal region, with a small amount of locoregional free fluid

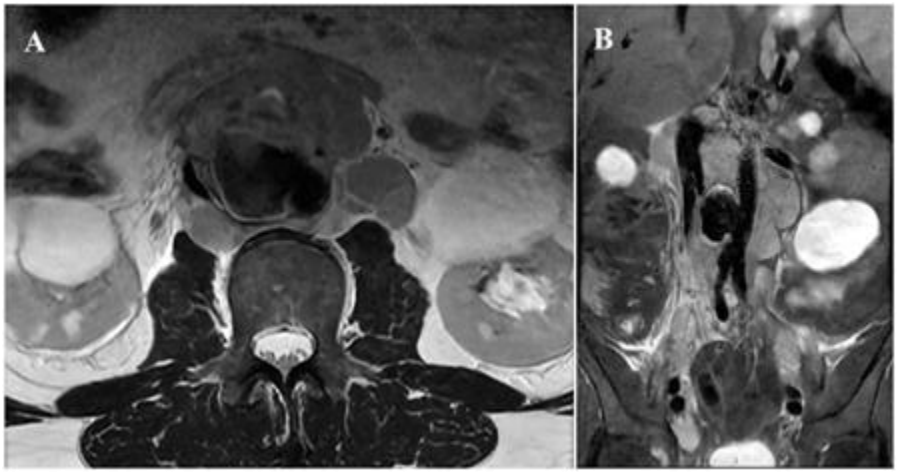

Figure 2. Magnetic resonance imaging of the lumbosacral spine: A – axial T2-weighted image; B – coronal T2-weighted image; a saccular aneurysmal dilatation of the infrarenal abdominal aorta is seen, with locoregional lymphadenopathy

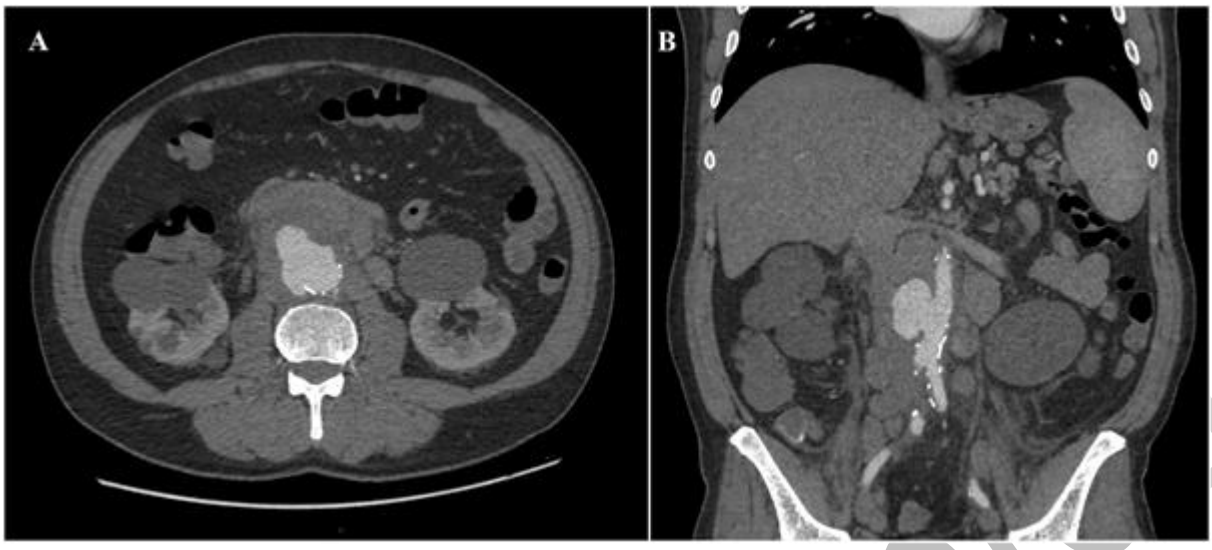

Figure 3. Computed tomography angiography of the abdominal vessels: A – axial image; B – coronal image; a saccular aneurysmal dilatation of the infrarenal abdominal aorta is clearly delineated, with locoregional lymphadenopathy and a small amount of retroperitoneal free fluid

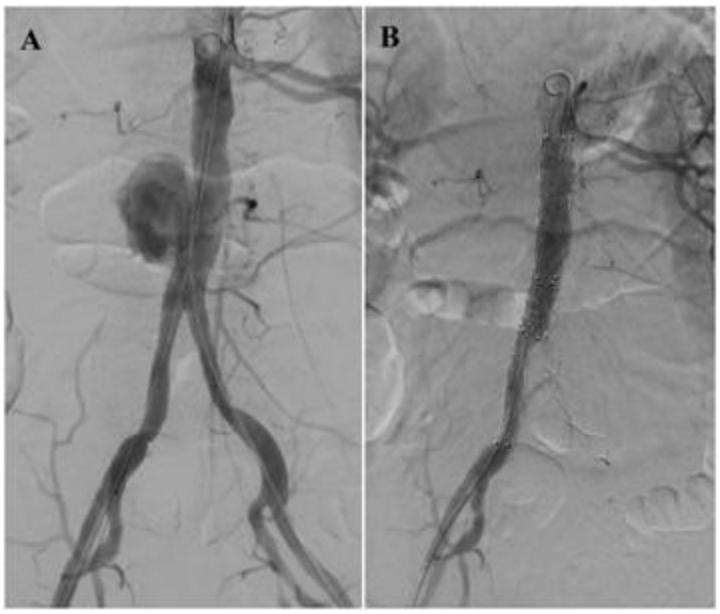

Figure 4. Abdominal aortic angiogram (digital subtraction angiography): A – before treatment: an aneurysmal sac is visible; B – after treatment: complete exclusion of the aneurysm from the circulation, with preserved flow through the right common and external iliac arteries, while the left common and external iliac arteries are occluded

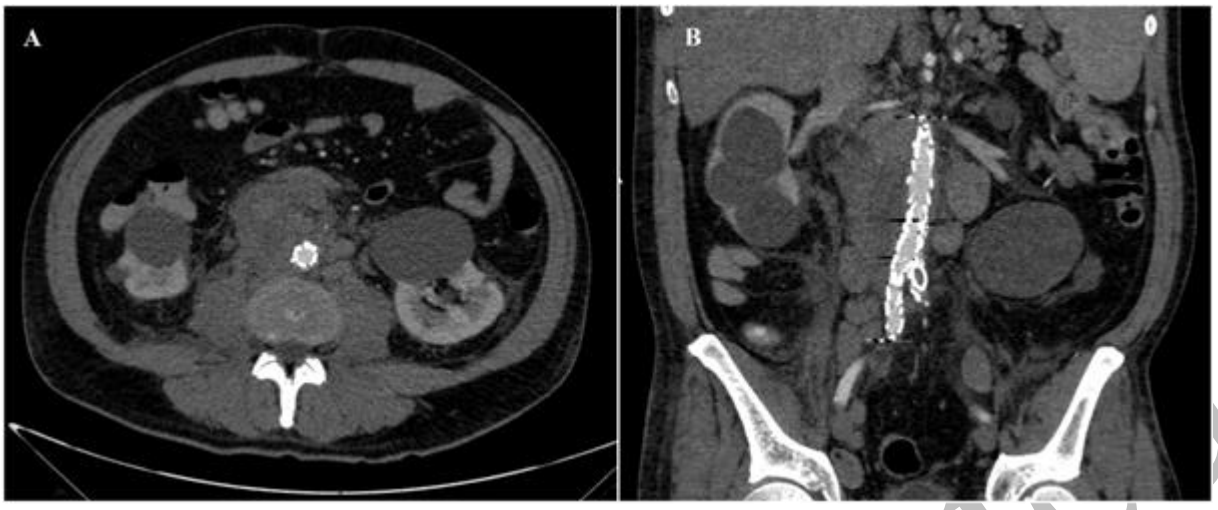

Figure 5. Follow-up computed tomography angiography: no evidence of endoleak, adjacent lymph node conglomerates with periaortic hematoma, and postprocedural occlusion of the left common iliac artery

