

EVALUATION OF KIDNEY FUNCTION IN AN ELDERLY PATIENT WITH ACUTE MYELOBLASTIC LEUKEMIA AFTER HEMATOPOIETIC STEM CELL TRANSPLANTATION: A CASE REPORT

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ABSTRACT

Relevance: Kidney functions in treating acute myeloblastic leukemia (AML) undergo serious effects, especially in elderly patients. Chemotherapeutic drugs used to prepare for hematopoietic stem cell transplantation (HSCT) inevitably affect elderly patients' kidney function. Moreover, involutive changes in the kidneys can physiologically decrease kidney function.

The study aimed to evaluate kidney function in an elderly patient with AML after HSCT.

Methods: The article describes a clinical case of AML in an elderly patient who underwent allogeneic HSCT.

Results: We analyzed the dynamics of the functional state from the moment of registration of AML to +100 days after HSCT. During the entire follow-up period, we did not detect any renal dysfunction in the elderly patient. Despite the HSCT and the effects of nephrotoxic drugs in an elderly patient + 100 days after HSCT, kidney function was preserved.

Conclusion: The described case highlights the importance of maintaining renal function in elderly patients after HSCT and long-term renal monitoring.

Keywords: hematopoietic stem cell transplantation (HSCT), bone marrow transplantation, acute myeloblastic leukemia (AML), renal failure, case report, glomerular filtration rate, complications, elderly patients.

Introduction: Currently, the treatment of elderly patients with acute myeloblastic leukemia (AML) is decided individually depending on the risk-benefit ratio, and the choice of treatment varies from hematopoietic stem cell transplantation (HSCT) to palliative therapy [1, 2]. At the same time, preserving kidney function in elderly patients treated for AML is crucial [3, 4]. Chemotherapeutic drugs used to prepare for hematopoietic stem cell transplantation (HSCT) inevitably affect elderly patients' kidney function [5-7]. Meanwhile, involutive changes in the kidneys and changes in hemodynamics in elderly patients could physiologically decrease renal function [8-10]. Particular attention among the elderly with AML is required by patients with concomitant chronic diseases, which in many cases determine the treatment tactics of an elderly patient. According to worldwide data, there is scant information about the state of the kidneys in elderly patients with AML in HSCT conditions.

The study aimed to evaluate kidney function in an elderly patient with AML after HSCT.

Materials and Methods: The article describes a clinical case of AML in an elderly patient who underwent allogeneic HSCT (Allo HSCT).

Patient Information: Patient N, 60 years old, applied to the National Scientific Center of Oncology (Astana, Kazakh-

stan) complaining of breath shortness and decreased exercise tolerance. She was diagnosed with AML (M4, high-risk group) after cytological examination of blood and bone marrow, cytochemical examination of blast cells, immunophenotyping on a flow cytofluorimeter, standard cytogenetic examination, molecular genetic examination by FISH and the cerebrospinal fluid analysis (Table 1).

Table 1 – Characteristics of the patient with AML

Parameter	Value
Gender	Female
Age	60 years
Nationality	Slavic
AML FAB-classification:	M4, a high-risk group
Myelogram	Blast cells 56%
Immunophenotyping	CD45dim40,0%, CD45moderate
Cytogenetic study	No mutation identified
Molecular genetic research by FISH method	No t(9;22)(q34;q11) translocation detected

Clinical parameters: The patient was registered for chronic viral hepatitis B and chronic cholecystitis. The outpatient medical card reported normal blood pressure levels. The patient's general condition was of moderate severity due to the underlying disease. Clinical symptoms from the vital organs

were not observed. Organs of urination: The kidney area was not visually altered. Urination was independent; the urine was yellow. The diuresis was adequate, 1.8-2.2 liters per day.

Diagnostics: The patient underwent cytological studies of blood and bone marrow, cytochemical examination of blast cells, immunophenotyping on a flow cytofluorimeter, standard cytogenetic examination, and molecular genetic examination by the FISH method.

In order to assess the renal functions of the patient, general clinical laboratory and instrumental methods of examination were carried out.

Treatment: The patient's treatment included induction courses of chemotherapy according to the 7+3 DNR 60mg/m² scheme. Bone marrow remission was not achieved in the first course of treatment. However, it was achieved after 21 days of the second course with 1.5% blast cells in the control myelogram. Subsequently, the patient underwent consolidating chemotherapy courses: 7+3 Idarubicin 12 mg/m², three courses with Azacitidine, two courses of IDAC, and the supporting course of 5+CF. During the treatment, the myelogram showed 1.5 to 2.4% of blast cells in the blood.

Further, in May 2022, the patient underwent Allo HSCT from a 100% compatible relative donor (sister). The conditioning regimen included Busulfan 232 mg per os from -5D to -3D and Fludarabine IV 45 mg/day from -7D to -2D. After the conditioning, the patient received 380 ml of suspended hematopoietic stem cells, amounting to 5.5 million CD34/kg. The initial preventive treatment of graft-versus-host disease (GvHD) was carried out using cyclophosphane at 50 mg/kg from +3D to +5D and tacrolimus at 1.7 mg/day. Complications after Allo HSCT included febrile neutropenia and invasive pulmonary aspergillosis. These complications required additional antiviral, antibacterial, and antifungal therapy. On Day 16 after Allo HSCT, the patient developed neutrophilic engraftment; the leukocyte level was above 1x10⁹/L. After Day 13, her platelet count exceeded 20x10⁹/L. According to the examination +100 days after HSCT, the bone marrow remission (myelogram-blasts of 2% per 500 cells) and complete donor chimerism (100%) were preserved.

The patient examinations +100 days after Allo HSCT revealed no pronounced changes in kidney function (Table 2).

Table 2 – Timeline of laboratory parameters of an elderly patient before and after HSCT

Parameter / Timing	Before HSCT	10 days after HSCT	18 days after HSCT	30 days after HSCT	90 days after HSCT	100 days after HSCT
Total protein, g/L	56.7	63.8	53.1	57.5	63.4	72.6
Albumin, g/L	30.1	36.7	29.3	34.3	31.2	42.1
Uric acid, μmol/L	280	242	150	386	423	607
Alkaline phosphatase, units/L	66	92	48	61	73	111
Urea, mmol/L	2.4	2.9	1.5	5.0	5.9	7.5
Creatinine, mkmol/L	72.4	73.3	78.6	74.5	95.7	94.6
GFR, ml/min/1,73 m ²	78	77	71	75	56	57

During the observation period, the excretory function of the kidneys in the studied patient was preserved. During the examination, no pathological changes were detected in the urinary sediment, and the daily diuresis was within 2200 ml.

Ultrasound diagnostics revealed no significant changes in kidney size or parenchymal thickness before and after HSCT. Kidney computed tomography also revealed no changes in kidney size before or after HSCT (Figures 1).

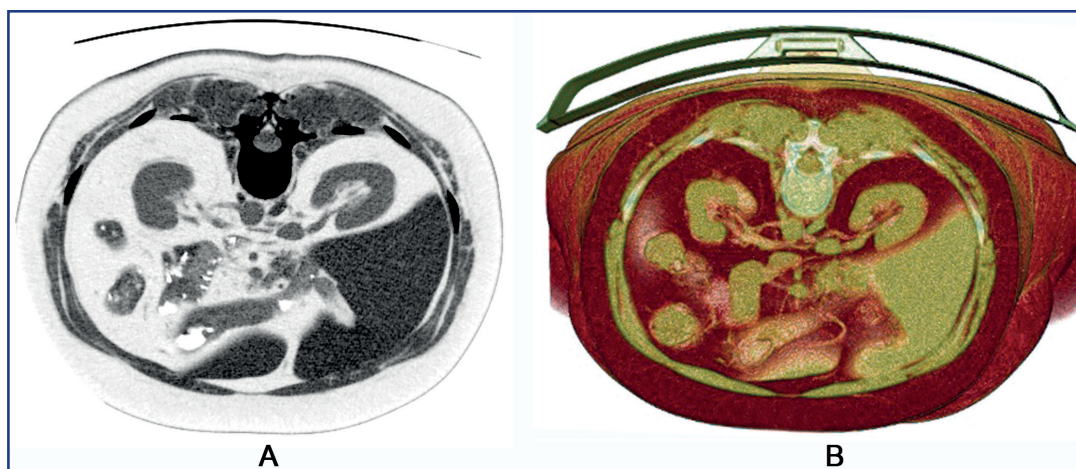


Figure 1 – CT of kidney and kidney vessels in a patient with AML before (A) and after (B) Allo HSCT

An ultrasonic Doppler examination showed no decrease in blood flow of the renal vessels. Considering the duration of immunosuppressive therapy (+100 days) and

no signs of GvHD, Prograf was continued at a reduced dose of 0.5 mg per day for one month and canceled afterward.

Discussion: According to the results of the conducted studies, the survival rate in elderly patients with acute leukemia has an unfavorable prognosis [11]. Meanwhile, the authors believe that the outcome of treatment in elderly patients depends not only on the disease but also on medical care, including active and supportive therapy.

In addition, it is now known that there is a high mortality rate of patients with acute leukemia worldwide, especially the elderly, who are increasingly less likely to undergo HSCT. At the same time, according to recent studies, it is known that a decrease in kidney function is associated with mortality in HSCT recipients.

In the presented study, we regularly monitored the patient's kidney function from the moment of registration to +100 days after HSCT. The studied patient did not have a period of exacerbation of concomitant diseases, and the patient did not have serious complications after HSCT, such as GVHD, which could also affect kidney function.

We believe preserved kidney function is key for long-term remission and survival of elderly patients after HSCT. Hopefully, our clinical case could help practitioners treat elderly patients with acute leukemia, especially in Kazakhstan, and expand the indications for HSCT. At the same time, we believe that more extensive studies are needed to obtain a more detailed report on the functional state of the kidneys in elderly recipients of HSCT. Based on this case, we want to emphasize the importance of monitoring kidney function and management tactics of elderly HSCT recipients, which in turn may affect the survival of elderly patients.

Conclusion: In our study, we presented the case of an elderly patient with AML who underwent HSCT. Despite long nephrotoxic chemotherapy, antifungal and antiviral therapy, kidney function in an elderly patient was preserved for +100 days after HSCT. The results of our clinical case reflect the importance of assessing the functional

state of the kidneys in elderly patients with AML before and after HSCT to determine early renal dysfunction and long-term monitoring.

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АНДАТПА

ГЕМОПОЭТИКАЛЫҚ ДІҢ ЖАСУШАЛАРЫН ТРАНСПЛАНТАЦИЯЛАУДАН КЕЙІН ЖЕДЕЛ МИЕЛОБЛАСТИКАЛЫҚ ЛЕЙКЕМИЯМЕН АУЫРАТЫН ЕГДЕ ЖАСТАҒЫ НАУҚАСТЫҢ БҮЙРЕК ҚЫЗМЕТІН БАҒАЛАУ: КЛИНИКАЛЫҚ ЖАҒДАЙ

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Өзектілігі: жедел миелобласттикалық лейкозды емдеудегі бүйрек қызметі, әсіресе егде жастағы науқастарда ауыр әсерге ұшырайды. Егде жастағы пациенттерді бірқатар химиотерапиялық препараттары қолдана отырып, ГДЖТ-ге дайындау сөзсіз бүйрек функциясына улы әсер етеді, сонымен қатар бүйректегі инволюциялық өзгерістер бүйрек қызметін физиологиялық тұрғыдан төмендетуі мүмкін.

Зерттеудің мақсаты – ГДЖТ-тен кейінгі жедел миелобласттикалық лейкозиямен ауыратын егде жастағы науқастың бүйрек қызметін бағалау болды.

Әдістері: біз аллогенді ГДЖТ жүргізілген жедел миелобласттикалық лейкозиямен ауыратын егде жастағы науқастың клиникалық жағдайын ұсындық.

Нәтижелері: біз егде жастағы науқастың жедел миелобласттикалық лейкозия тіркелген сәттен бастап ГДЖТ-ден кейін +100 күнге дейінгі функционалдық жағдайының динамикасын талдадық. Бақылау кезеңінде біз егде жастағы науқаста бүйрек ауруларын анықтаған жоқпыз. Егде жастағы науқаста ГДЖТ және нефротоксикалық препараттардың әсеріне қарамастан, ГДЖТ кейін + 100 күн, бүйрек қызметі сақталды.

Қорытынды: бұл жағдай егде жастағы емделушілерде ГДЖТ-дан кейін бүйрек қызметін сақтаудың және бүйрек қызметін ұзақ уақыт бақылаудың маңыздылығын көрсетеді.

Түйінді сөздер: гемопоэтикалық дің жасушаларын трансплантациялау, сүйек кемігін трансплантациялау, жедел миелобласттикалық лейкозия, бүйрек жеткіліксіздігі, клиникалық жағдай, шумақтық сүзілу жылдамдығы, асқынулар, егде жастағы науқастар.

АННОТАЦИЯ

ОЦЕНКА ФУНКЦИЙ ПОЧЕК У ПОЖИЛОГО ПАЦИЕНТА С ОСТРЫМ МИЕЛОБЛАСТНЫМ ЛЕЙКОЗОМ ПОСЛЕ ТРАНСПЛАНТАЦИИ ГЕМОПОЭТИЧЕСКИХ СТЕЛОВЫХ КЛЕТОК: КЛИНИЧЕСКИЙ СЛУЧАЙ

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Актуальность: Функции почек при лечении острого миелобластного лейкоза подвергаются серьезным воздействиям, особенно у пожилых пациентов. Подготовка пожилых пациентов к ТГСК с использованием ряда химиотерапевтических препаратов неизбежно оказывает токсическое действие на функцию почек, к тому же инволютивные изменения в почках могут физиологически снижать функцию почек.

Цель исследования – оценить функцию почек у пожилого пациента с острым миелобластным лейкозом после ТГСК.

Методы: В статье представлен клинический случай острого миелобластного лейкоза у пожилого пациента, которому была проведена аллогенная ТГСК.

Результаты: Мы проанализировали динамику функционального состояния у пожилого больного с момента регистрации острого миелобластного лейкоза до +100 дней после трансплантации гемопоэтических стволовых клеток (ТГСК). В течение всего периода наблюдения мы не выявили почечных нарушений у пожилого пациента. Несмотря на ТГСК и воздействие нефротоксических препаратов у пожилого пациента на + 100 дней после ТГСК, функция почек была сохранена.

Заключение: Описанный случай подчеркивает важность поддержания функции почек у пожилых пациентов после ТГСК и длительного мониторинга функции почек.

Ключевые слова: трансплантация гемопоэтических стволовых клеток, трансплантация костного мозга, острый миелобластный лейкоз, почечная недостаточность, клинический случай, скорость клубочковой фильтрации, осложнения, пожилые пациенты.

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