

o tom, že celkové přežívání u HD-dependentních nemocných a období bez relapsu je u nich při použití vysokodávkované léčby stejné, jako u těch s normální renální funkcí (36, 37). Jediným rozdílem je dávka melfalanu podávaného v přípravném režimu, která se musí redukovat o 25–50 % (i s ohledem na věk). Pokud u nemocných v PDL přetrvává kompletní remise MM, lze u nich uvažovat i o transplantaci ledviny. Podmínkou je kompletní hematologická remise (negativní průkaz paraproteinu v séru, normální počet plazmatických buněk v kostní dřeni) a stabilizace či ústup osteolytických změn na skeletu. Ideální je, pokud remise trvá 3 roky, za minimum je považován 1 rok (5). Tito nemocní jsou po transplantaci ledviny ve zvýšeném riziku relapsu MM z důvodu užívání imunosuprese,

a to zejména při použití některých antirejekčních léků (antithymocytární globulin). Tuto skutečnost je u nich potřeba zohlednit při léčbě akutních rejekcí a léčbu modifikovat (např. i použitím nestandardních postupů a léků, např. bortezomibu).

Zajímavou otázkou je i vznik MM de novo po transplantaci ledviny u nemocných s renálním selháním jiné etiologie. Incidence tohoto nádoru je v porovnání s jinými lymfoproliferacemi (Hodgkinova choroba, NHL či chronická lymfatická leukemie) obdobná, ale celkové přežívání je jednoznačně nejhorší. Podávání azatioprinu jako chronické antirejekční léčby je spojeno s menším rizikem vzniku MM než použití jiných imunosupresiv (38).

LITERATURA

1. Tsakiris DJ, Stel VS, Finne P, et al. Incidence and outcome of patients starting renal replacement therapy for end-stage renal disease due to multiple myeloma or light-chain deposition disease: an ERA-EDTA Registry study. *Nephrol Dial Transplant* 2010; 25: 1200–1206.
2. Knudsen LM, Hippe E, Hjorth M, et al. Renal function in newly diagnosed multiple myeloma - a demographic study of 1353 patients. The Nordic Myeloma Study Group. *Eur J Haematol* 1994; 53: 207–212.
3. Dimopoulos MA, Terpos E, Chanan-Khan A, et al. Renal impairment in patients with multiple myeloma: a consensus statement on behalf of the International Myeloma Working Group. *J Clin Oncol* 2010; 28: 4976–4984.
4. Wirk B. Renal failure in multiple myeloma: a medical emergency. *Bone Marrow Transplantation* 2011; 46: 771–783.
5. Korbet SM, Schwartz MM. Multiple myeloma. *J Am Soc Nephrol* 2006; 17: 2533–2545.
6. Heher EC, Renke HG, Laubach JP, et al. Kidney disease and multiple myeloma. *Clin J Am Soc Nephrol* 2013; 8: 2007–2017.
7. Wochner RD, Strober W, Waldmann TA. The role of the kidney in the catabolism of Bence Jones proteins and immunoglobulin fragments. *J Exp Med* 1967; 126: 207–221.
8. Ying WZ, Wang PX, Sanders PW. Pivotal role of apoptosis signal-regulating kinase 1 in monoclonal free light chain-mediated apoptosis. *Am J Patol* 2012; 180: 41–47.
9. Sengul S, Zwizinski C, Batuman V. Role of MAPK pathways in the light chain induced cytokine production in human proximal tubule cells. *Am J Renal Physiol* 2003; 284: F1245–F1254.
10. Cockwell P, Hutchison CA. Management options for cast nephropathy in multiple myeloma. *Current Opinion in Nephrology and Hypertension* 2010; 19: 550–555.
11. Herrera GA, Sanders PW. Paraproteinemic renal diseases that involve the tubulointerstitium. *Contrib Nephrol* 2007; 153: 105–115.
12. Ryšavá R AL. amyloidosis with renal involvement. *Kidney Blood Pres Res* 2007; 30: 359–364.
13. Zhu L, Herrera GA, Murphy-Ullrich JE, et al. Pathogenesis of glomerulosclerosis in light chain deposition disease. Role for transforming growth factor-beta. *Am J Pathol* 1995; 147: 375–385.
14. Kyle RA, Gertz MA, Witzig TE, et al. Review of 1027 patients with newly diagnosed multiple myeloma. *Mayo Clin Proc* 2003; 78: 21–33.
15. Rajkumar SV, Dimopoulos MA, Palumbo A. International Myeloma Working Group updated criteria for the diagnosis of multiple myeloma. *Lancet* 2014; 15: e538–e548.
16. Kyle RA, Rajkumar SV. Criteria for diagnosis, staging, risk stratification and response assessment of multiple myeloma. *Leukemia* 2009; 23: 3–9.
17. Palumbo A, Anderson K. Multiple myeloma. *N Engl J Med* 2011; 364: 1046–1060.
18. Hutchison CA, Basnayake K, Cockwell P. Serum free light chain assessment in monoclonal gammopathy and kidney disease. *Nat Rev Nephrol* 2009; 5: 621–627.
19. Bradwell AR, Harding SJ, Fourrier NJ, et al. Assessment of monoclonal gammopathies by nephelometric measurement of individual immunoglobulin kappa/lambda ratios. *Clin Chem* 2009; 55: 1646–1655.
20. Hutchison CA, Plant T, Drayson M. Serum free light chain measurement aids the diagnosis of myeloma in patients with severe renal failure. *BCM Nephrology* 2008; 9: 11–19.
21. Dispenzieri A, Kyle R, Merlini G, et al. International Myeloma Working Group guidelines for serum-free light chain analysis in multiple myeloma and related disorders. *Leukemia* 2009; 23: 215–224.
22. Haubitz M, Peest D. Myeloma – new approaches to combined nephrological-haematological management. *Nephrol Dial Transplant* 2006; 21: 582–590.
23. Ludwig H, Drach J, Graf H, et al. Reversal of acute renal failure by bortezomib-based chemotherapy in patients with multiple myeloma. *Haematologica* 2007; 92: 1411–1414.
24. Kastritis E, Anagnostopoulos A, Roussou M, et al. Reversibility of renal failure in newly diagnosed multiple myeloma patients treated with high dose dexamethazone-containing regimens and the impact of novel agents. *Haematologica* 2007; 92: 546–549.
25. Chanan-Khan AA, Kaufman JL, Mehta J, et al. Activity and safety of bortezomib in multiple myeloma with advanced renal failure. *Blood* 2007; 109: 2604–2606.
26. Dimopoulos MA, Roussou M, Gaviatopoulos M, et al. Outcomes of newly diagnosed myeloma patients requiring dialysis: renal recovery, importance of rapid response and survival benefit. *Blood Cancer J* 2017; 7: e571.
27. Clark WF, Stewart AK, Rock GA, et al. Plasma exchange when myeloma presents as acute renal failure: a randomized, controlled trial. *Ann Intern Med* 2005; 143: 777–784.
28. Leung N, Gertz MA, Zeldenrust SR. Improvement of cast nephropathy with plasma exchange depends on the diagnosis and on reduction of serum free light chains. *Kidney Int* 2008; 73: 1282–1288.
29. Hutchison CA, Cockwell P, Reid S, et al. Efficient removal of immunoglobulin free light chains by hemodialysis for multiple myeloma. In vitro and in vivo studies. *J Am Soc Nephrol* 2007; 18: 886–895.
30. Hutchison CA, Bradwell AR, Cook M, et al. Treatment of Acute Renal Failure Secondary to Multiple Myeloma with Chemotherapy and Extended High Cut-Off Hemodialysis. *Clin J Am Soc Nephrol* 2009; 4: 745–754.
31. Gerth HU, Pohlen M, Görlich D, et al. Impact of High-Cut-Off Dialysis on Renal Recovery in Dialysis-Dependent Multiple Myeloma Patients: Results from a Case-Control Study. *Plos One* 6; 11: e0154993.
32. Bridoux F, Carron PL, Pegourie B, et al. Effect of high-cutoff hemodialysis vs conventional hemodialysis on hemodialysis independence among patients with myeloma cast nephropathy. A randomized clinical trial. *JAMA* 2017; 318: 2099–2110.
33. Hutchison CA, Cockwell P, Moroz V, et al. High cutoff versus high-flux haemodialysis for myeloma cast nephropathy in patients receiving bortezomib-based chemotherapy (EuLITE): a phase 2 randomised controlled trial. *Lancet Haematol* 2019; 6(4): e217–e228.
34. Finkel K, Fabbri P. High cut-off hemodialysis for myeloma cast nephropathy – do we finally have an answer? *J Onco-Nephrol* 2017; 1: 67–70.
35. Haynes RJ, Read S, Collins GP, et al. Presentation and survival of patients with severe acute kidney injury and multiple myeloma: a 20-year experience from a single centre. *Nephrol Dial Transplant* 2010; 25: 419–426.
36. Parikh GC, Amjad AL, Saliba RM, et al. Autologous hematopoietic stem cell transplantation may reverse renal failure in patients with multiple myeloma. *Biol Blood Marrow Transplant* 2009; 15: 812–816.
37. Raab MS, Breitkreutz I, Hundemer M, et al. The outcome of autologous stem cell transplantation in patients with plasma cell disorders and dialysis-dependent renal failure. *Haematologica* 2006; 11: 1555–1558.
38. Caillard S, Agodoa LY, Bohlen EM, et al. Myeloma, Hodgkin disease and lymphoid leukemia after renal transplantation: characteristics, risk factors and prognosis. *Transplantation* 2006; 81: 888–895.
39. Bridoux F, Leung N, Hutchison C, et al. Diagnosis of monoclonal gammopathy of renal significance. *Kidney Int* 2015; 87: 698–711.
40. Sethi S, Rajkumar SV, D'Agati VD. The complexity and heterogeneity of monoclonal immunoglobulin-associated renal diseases. *J Am Soc Nephrol* 2018; 29: 1810–1823.