

Kardiyovasküler Sonuçlar ve Ev Hemodiyalizi

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Naseem Wiegley, Jose A. Morfin

Çeviri:

Prof. Dr. İdris Şahin, Doç. Dr. Mehmet Usta

ANA BAŞLIKLAR

KARDİOVASKÜLER HASTALIKLARIN EPİDEMİYOLOJİSİ
SOL VENTRİKÜL HİPERTROFİSİNİN PATOFİZYOLOJİSİ
SOL VENTRİKÜL HİPERTROFİSİNİN KLİNİK MEDİYATÖRLERİ
HEMODİYALİZİN TETİKLEDİĞİ MİYOKARDİYAL SERSEMME (STUNNING)
SIK HEMODİYALİZİN KLİNİK FAYDALARI

Kronik Böbrek Hastalığı (KBH) olan hastalarda kardiyovasküler hastalıklar yaygındır ve KBH'lı hastalarda, normal nüfusa göre iki kattan daha fazla kardiyovasküler hastalık geliştiği bildirilmiştir.¹ Kalp ve damar hastalıklarının prevalansı, KBH'nın ilerlemesi ile artmaktadır ve ilerlemiş böbrek hastalığı olanlarda, özellikle de diyaliz ihtiyacı olan bireylerde, mortalitenin önde gelen ölüm nedenidir. Sol ventrikül hipertrofisi (SVH), volüm/basınç yüklenmesine verilen uygunsuz bir tepkidir ve kardiyomiyopatiye yol açar. SVH, son dönem böbrek hastalığında (SDBH) oldukça yaygındır ve %90'a varan oranlarda bildirilmiştir. Kalp-damar hastalıklarına bağlı mortalite ve morbiditeyi öngörmeye önemli bir faktördür.² Anemi, kemik-mineral metabolizması, üremi/inflamasyon ve de en önemlisi olarak da hipertansiyon, SVH gelişiminde rol oynarlar.³ Sonuç olarak, her ne kadar geçtiğimiz on yıl içinde, SDBH olan

nedenler ve kardiyovasküler mortalite ve hastaneye yatış riski, PD'ye başlayan hastalardakine benzer bulunmuştur.

Sık ve kısa HD ile ister merkezde KHD ister haftada 3 kez evde olsun, uzun hemodiyalizde mortaliteyi araştıran daha küçük çalışmalar vardır. Bu çalışmaların sonuçları çelişkili ve tartışmalıdır ki muhtemelen bunun nedeni bu çalışmaların istatistiksel gücünün az olması ve metodolojik sınırlamalara bağlıdır. Kayıt edilmesi gereken hasta sayısının çokluğu ve SDBH hastalarında yılda %20'ye yaklaşan yüksek morbidite ve mortalite göz önüne alındığında, mortalite odaklı randomize kontrollü bir çalışma yapmak mümkün görünmemektedir. Bu nedenle yukarıda tartışıldığı üzere, sol ventrikül hipertrofisi gibi ara sonuçları kullanan gözlemsel çalışmalar ve kısa dönemli klinik çalışmalar gelecekteki prospektif klinik çalışmalara yön verecektir.

Tablo 9-1: Daha sık/yoğun hemodiyaliz tedavisinin kardiyovasküler faydalarına ilişkin klinik çalışmaların özeti

| | Gece EHD | EHD | Merkezde HD |
|-------------------------------------|----------|------|-------------|
| Hipertansiyon /Kan basıncı kontrolü | <%5 | <%7 | Referans |
| Sistolik kan basıncı | | | |
| Sol ventrikül kütle indeksi | <%8 | <%12 | Referans |
| Miyokardiyal sersemleme oluşu | <%50 | <%25 | Referans |
| Bölgesel duvar hareket bozukluğu | <%38 | <%31 | Referans |

Gece EHD: Gece ev hemodiyalizi (haftada 6 kez), EHD: Ev HD (haftada 6 kez), Merkezde HD: (haftada 3 kez)

[Daha fazla bilgi için 7. Bölüme bakınız.]

KAYNAKLAR

1. 2017 USRDS annual data report: executive summary. Am J Kidney Dis.2018;71(3):S1-S8.
2. Silberberg JS, Barre PE, Prichard SS, Sniderman AD. Impact of left ventricular hypertrophy on survival in end-stage renal disease. Kidney Int. 1989;36(2):286-290.
3. Di Lullo L, Gorini A, Russo D, Santoboni A, Ronco C. Left ventricular hypertrophy in chronic kidney disease patients: from pathophysiology to treatment. Cardiorenal Med. 2015;5(4):254-266.
4. Flythe JE, Xue H, Lynch KE, Curhan GC, Brunelli SM. Association of mortality risk with various definitions of intradialytic hypotension. J Am Soc Nephrol. 2015;26(3):724-734.
5. Foley RN, Gilbertson DT, Murray T, Collins AJ. Long interdialytic interval and mortality among patients receiving hemodialysis. N Engl J Med. 2011;365(12):1099-1107.
6. McCullough PA, Chan CT, Weinhandl ED, Burkart JM, Bakris GL. Intensive hemo-

- dialysis, left ventricular hypertrophy, and cardiovascular disease. *Am J Kidney Dis.* 2016;68(5s1):S5-S14.
7. Foley RN, Curtis BM, Randell EW, Parfrey PS. Left ventricular hypertrophy in new hemodialysis patients without symptomatic cardiac disease. *Clin J Am Soc Nephrol.* 2010;5(5):805-813.
 8. Jefferies HJ, Virk B, Schiller B, Moran J, McIntyre CW. Frequent hemodialysis schedules are associated with reduced levels of dialysis-induced cardiac injury (myocardial stunning). *Clin J Am Soc Nephrol.* 2011;6(6):1326-1332.
 9. yus JC, Mizani MR, Achinger SG, Thadhani R, Go AS, Lee S. Effects of short daily versus conventional hemodialysis on left ventricular hypertrophy and inflammatory markers: a prospective, controlled study. *J Am Soc Nephrol.* 2005;16(9):2778-2788.
 10. Chertow GM, Levin NW, Beck GJ, et al. In-center hemodialysis six times per week versus three times per week. *N Engl J Med.* 2010;363(24):2287-2300.
 11. Zhang H, Schaubel DE, Kalbfleisch JD, et al. Dialysis outcomes and analysis of practice patterns suggests the dialysis schedule affects day-of-week mortality. *Kidney Int.* 2012;81(11):1108-1115.
 12. Fotheringham J, Fogarty DG, El Nahas M, Campbell MJ, Farrington K. The mortality and hospitalization rates associated with the long interdialytic gap in thrice-weekly hemodialysis patients. *Kidney Int.* 2015;88(3):569-575.
 13. Zoccali C, Benedetto FA, Mallamaci F, et al. Left ventricular mass monitoring in the follow-up of dialysis patients: prognostic value of left ventricular hypertrophy progression. *Kidney Int.* 2004;65(4):1492-1498.
 14. London GM, Pannier B, Guerin AP, et al. Alterations of left ventricular hypertrophy in and survival of patients receiving hemodialysis: follow-up of an interventional study. *J Am Soc Nephrol.* 2001;12(12):2759-2767.
 15. Ritz E. Left ventricular hypertrophy in renal disease: beyond preload and afterload. *Kidney Int.* 2009;75(8):771-773.
 16. Mominadam S, Ozkahya M, Kayikcioglu M, et al. Interdialytic blood pressure obtained by ambulatory blood pressure measurement and left ventricular structure in hypertensive hemodialysis patients. *Hemodial Int.* 2008;12(3): 322-327.
 17. Martin LC, Franco RJ, Gavras I, et al. Association between hypervolemia and ventricular hypertrophy in hemodialysis patients. *Am J Hypertens.* 2004;17 (12 Pt 1):1163-1169.
 18. Gross ML, Ritz E. Hypertrophy and fibrosis in the cardiomyopathy of uremia— beyond coronary heart disease. *Semin Dial.* 2008;21(4):308-318.
 19. Steigerwalt S, Zafar A, Mesiha N, Gardin J, Provenzano R. Role of aldosterone in left ventricular hypertrophy among African-American patients with end-stage renal disease on hemodialysis. *Am J Nephrol.* 2007;27(2):159-163.
 20. Xu X, Hu X, Lu Z, et al. Xanthine oxidase inhibition with febuxostat attenuates systolic overload-induced left ventricular hypertrophy and dysfunction in mice. *J Card Fail.* 2008;14(9):746-753.
 21. MacRae JM, Levin A, Belenkie I. The cardiovascular effects of arteriovenous fistulas in chronic kidney disease: a cause for concern? *Semin Dial.* 2006;19(5):349-352.
 22. Nishida K, Kyoji S, Yamaguchi O, Sadoshima J, Otsu K. The role of autophagy in the heart. *Cell Death Differ.* 2009;16(1):31-38.
 23. Zoccali C, Benedetto FA, Tripepi G, Mallamaci F. Cardiac consequences of hypertension in hemodialysis patients. *Semin Dial.* 2004;17(4):299-303.
 24. Dorn GW 2nd. Apoptotic and non-apoptotic programmed cardiomyocyte death in ventricular remodelling. *Cardiovasc Res.* 2009;81(3):465-473.
 25. Ayus JC, Go AS, Valderrabano F, et al. Effects of erythropoietin on left ventricular hypertrophy in adults with severe chronic renal failure and hemoglobin <10 g/dL. *Kidney Int.* 2005;68(2):788-795.

26. Chen HH, Targ DC, Lee KF, Wu CY, Chen YC. Epoetin alfa and darbepoetin alfa: effects on ventricular hypertrophy in patients with chronic kidney disease. *J Nephrol.* 2008;21(4):543-549.
27. Achinger SG, Ayus JC. The role of vitamin D in left ventricular hypertrophy and cardiac function. *Kidney Int Suppl.* 2005(95):S37-S42.
28. Metivier F, Marchais SJ, Guerin AP, Pannier B, London GM. Pathophysiology of anaemia: focus on the heart and blood vessels.
35. Kovesdy CP, Quarles LD. Fibroblast growth factor-23: what we know, what we don't know, and what we need to know. *Nephrol Dial Transplant.* 2013;28(9):2228-2236.
36. Gutierrez OM, Mannstadt M, Isakova T, et al. Fibroblast growth factor 23 and mortality among patients undergoing hemodialysis. *N Engl J Med.* 2008;359(6):584-592.
37. Amaral AP, Oskoueï B, Hu M-C, et al. Fibroblast growth factor 23 induces left ventricular hypertrophy. *J Am Coll Cardiol.* 2012;59(13 suppl):E1059.
38. Mirza MA, Larsson A, Melhus H, Lind L, Larsson TE. Serum intact FGF23 associate with left ventricular mass, hypertrophy and geometry in an elderly population. *Atherosclerosis.* 2009;207(2):546-551.
39. Rao MV, Qiu Y, Wang C, Bakris G. Hypertension and CKD: Kidney Early Evaluation Program (KEEP) and National Health and Nutrition Examination Survey (NHANES), 1999-2004. *Am J Kidney Dis.* 2008;51(4 suppl 2):S30-S37.
40. Bakris GL, Burkart JM, Weinhandl ED, McCullough PA, Kraus MA. Intensive hemodialysis, blood pressure, and antihypertensive medication use. *Am J Kidney Dis.* 2016;68(5s1):S15-S23.
41. K/DOQI clinical practice guidelines for cardiovascular disease in dialysis patients. *Am J Kidney Dis.* 2005;45(4 suppl 3):S1-S153.
42. Inrig JK, Patel UD, Gillespie BS, et al. Relationship between interdialytic weight gain and blood pressure among prevalent hemodialysis patients. *Am J Kidney Dis.* 2007;50(1):108-118, 118.e1-4.
43. Reddan DN, Szczech LA, Hasselblad V, et al. Intradialytic blood volume monitoring in ambulatory hemodialysis patients: a randomized trial. *J Am Soc Nephrol.* 2005;16(7):2162.
44. Agarwal R, Alborzi P, Satyan S, Light RP. Dry-weight reduction in hypertensive hemodialysis patients (DRIP): a randomized, controlled trial. *Hypertension.* 2009;53(3):500-507.
45. Ruilope LM, Schmieder RE. Left ventricular hypertrophy and clinical outcomes in hypertensive patients. *Am J Hypertens.* 2008;21(5):500-508.
46. Heerspink HJ, Ninomiya T, Zoungas S, et al. Effect of lowering blood pressure on cardiovascular events and mortality in patients on dialysis: a systematic review and meta-analysis of randomised controlled trials. *Lancet.* 2009;373(9668):1009-1015.
47. Zoccali C, Moissl U, Chazot C, et al. Chronic fluid overload and mortality in ESRD. *J Am Soc Nephrol.* 2017;28(8):2491-2497.
48. Kalantar-Zadeh K, Regidor DL, Kovesdy CP, et al. Fluid retention is associated with cardiovascular mortality in patients undergoing long-term hemodialysis. *Circulation.* 2009;119(5):671-679.
49. Raja R, Henriquez M, Kramer M, Rosenbaum JL. Intradialytic hypotension—role of osmolar changes and acetate influx. *Trans Am Soc Artif Intern Organs.* 1979;25:419-421.
50. Flythe JE, Kimmel SE, Brunelli SM. Rapid fluid removal during dialysis is associated with cardiovascular morbidity and mortality. *Kidney Int.* 2011;79(2):250-257.
51. Sands JJ, Usvyat LA, Sullivan T, et al. Intradialytic hypotension: frequency, sources of variation and correlation with clinical outcome. *Hemodial Int.* 2014;18(2):415-422.
52. Assimon MM, Wenger JB, Wang L, Flythe JE. Ultrafiltration rate and mortality in maintenance hemodialysis patients. *Am J Kidney Dis.* 2016;68(6):911-922.
53. Chou JA, Streja E, Nguyen DV, et al. Intradialytic hypotension, blood pressure changes and mortality risk in incident hemodialysis patients. *Nephrol Dial Transplant.* 2018;33(1):149-

- 159.
54. McIntyre CW. Effects of hemodialysis on cardiac function. *Kidney Int.* 2009;76(4):371-375.
 55. Findlay MD, Dawson J, Dickie DA, et al. Investigating the relationship between cerebral blood flow and cognitive function in hemodialysis patients. *J Am Soc Nephrol.* 2019;30(1):147-158.
 56. McIntyre CW, Harrison LE, Eldehni MT, et al. Circulating endotoxemia: a novel factor in systemic inflammation and cardiovascular disease in chronic kidney disease. *Clin J Am Soc Nephrol.* 2011;6(1):133-141.
 57. Iest CG, Vanholder RC, Ringoir SM. Loss of residual renal function in patients on regular haemodialysis. *Int J Artif Organs.* 1989;12(3):159-164.
 58. Jansen MA, Hart AA, Korevaar JC, Dekker FW, Boeschoten EW, Krediet RT. Predictors of the rate of decline of residual renal function in incident dialysis patients. *Kidney Int.* 2002;62(3):1046-1053.
 59. Lee Y, Okuda Y, Sy J, et al. Ultrafiltration rate effects declines in residual kidney function in hemodialysis patients. *Am J Nephrol.* 2019;50(6):481-488.
 60. Zuber M, Steinmann E, Huser B, Ritz R, Thiel G, Brunner F. Incidence of arrhythmias and myocardial ischaemia during haemodialysis and haemofiltration. *Nephrol Dial Transplant.* 1989;4(7):632-634.
 61. McIntyre CW, Burton JO, Selby NM, et al. Hemodialysis-induced cardiac dysfunction is associated with an acute reduction in global and segmental myocardial blood flow. *Clin J Am Soc Nephrol.* 2008;3(1):19-26.
 62. Braunwald E, Rutherford JD. Reversible ischemic left ventricular dysfunction: evidence for the "hibernating myocardium". *J Am Coll Cardiol.* 1986;8(6):1467-1470.
 63. Burton JO, Jefferies HJ, Selby NM, McIntyre CW. Hemodialysis-induced cardiac i