

Elevated E/E' Predicts Cardiovascular Events in Hemodialysis Patients with Preserved Systolic Function

S. Ait Faqih, N. Lemtioui, S. El Khayat, M. Zamd, G. Medkouri, M. Benghanem, B. Ramdani
Service de néphrologie, hémodialyse et transplantation rénale, centre hospitalier universitaire Ibn Rochd, Casablanca



INTRODUCTION

The high mortality of hemodialysis (HD) patients is mainly attributable to cardiovascular (CV) disorders, which are responsible for more than 40% of the deaths. Hemodialysis (HD) patients without any apparent CV disorder are at higher risk of future CV events. Identifying HD patients with an increased CV risk is of clinical importance and would enable preventive measures to be implemented

Aims of the study

The incidence of heart failure despite preserved left ventricular (LV) systolic function has recently increased and now comprises nearly 50% of congestive heart failure patients. The ratio of early transmitral flow velocity to early mitral annular velocity (E/E') has recently been proposed as an index of LV filling pressure. The purpose of this study was to investigate whether an elevated E/E' ratio, as an index of LV diastolic function, predicts CV events in chronic HD patients.

MATERIELS ET METHODS

Prospective single center cohort study over 2 year follow up period 84 HD patients with preserved systolic function routinely treated in the dialysis unit of Ibn Rochd Hospital for at least 6 months.

Exclusion criteria:

-Ejection fraction < 50%, a malignancy, active infection, non sinus rhythm, pericardial effusion, evidence of major valvular heart disease

The subjects demographic and clinical data were recorded at entry. The echocardiographic evaluation was performed after a dialysis session to minimize the effect of fluid overload.

Statistical analysis:

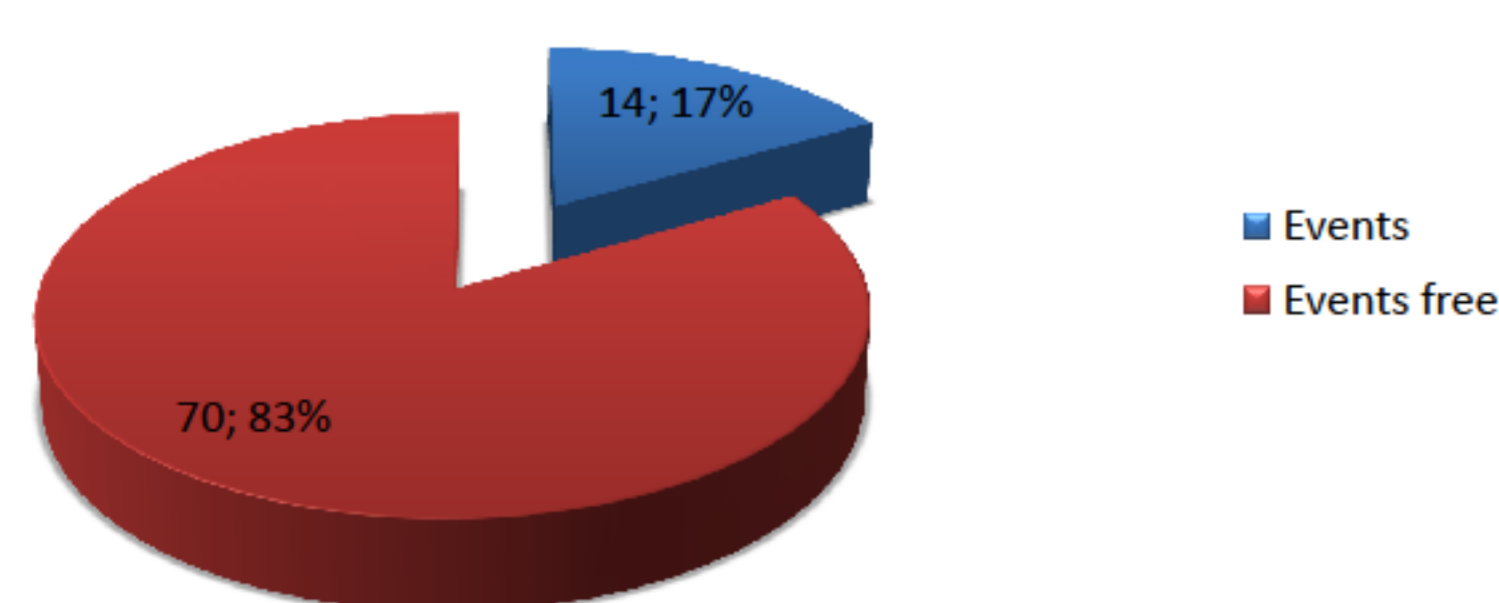
SPSS software (version 22)

Survival was estimated on the basis of the Kaplan- Meier curves, and compared using the log-rank test

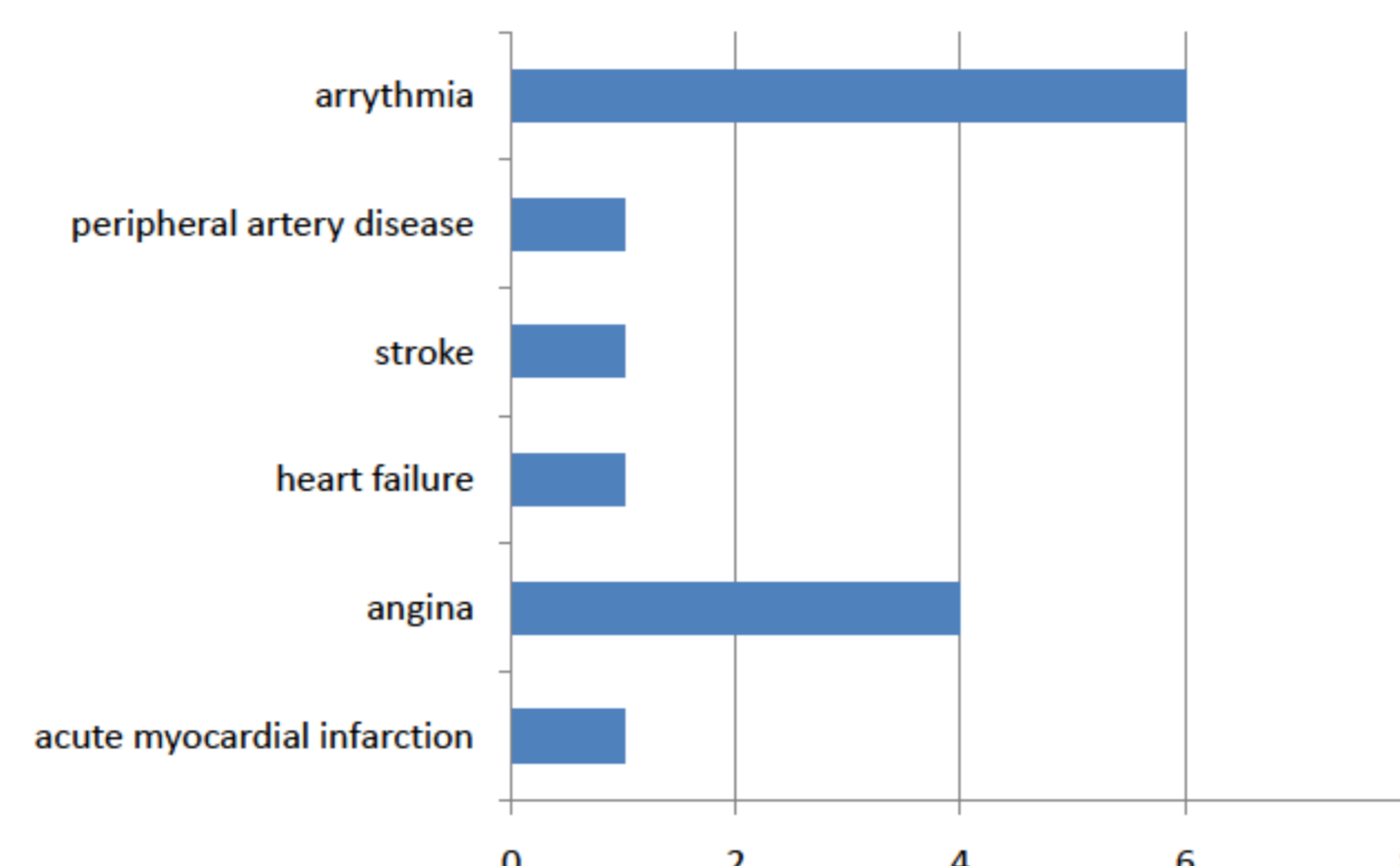
RESULTATS

14 HD patients experienced CV events including acute myocardial infarction, symptomatic angina, heart failure, stroke and peripheral artery disease. The E/E' values (14,±5) in the CV event group were significantly higher than in the non CV event group (7,37±3,02) (p=0,004). The Kaplan Meier analysis shows that the incidence of CV events was significantly higher in the group whose E/E' was ≥15 (log rank p=0,0001). Multivariate Cox proportional hazards regression analysis indicated that the E/E' ratio is predictor of CV events in HD patients with preserved left ventricular systolic function (p=0,0001).

Cardiovascular events recorded



Cardiovascular events



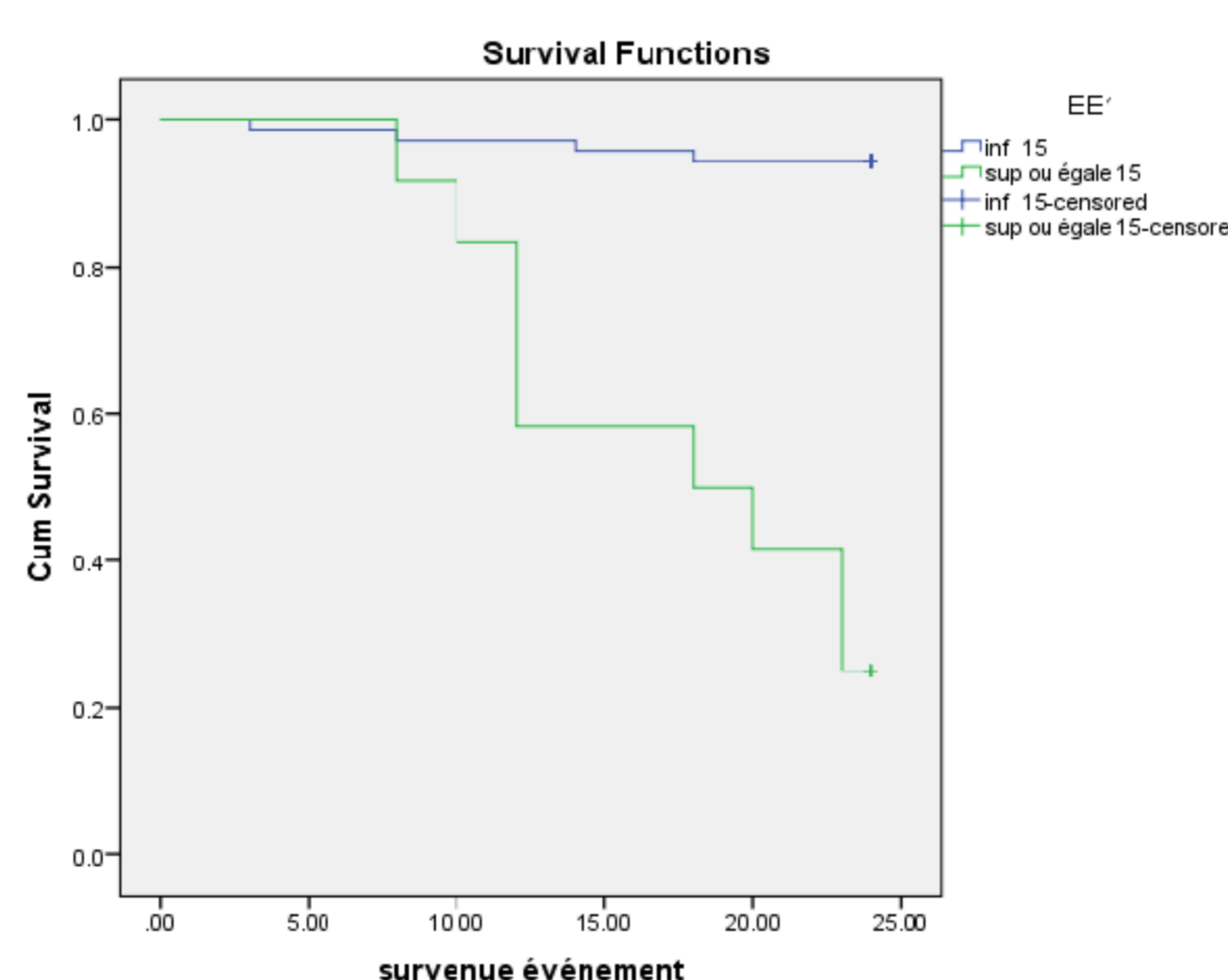
Comparison of Demographic and Clinical Characteristics of Hemodialysis patients with and without Cardiovascular Events

	Event free (n=70)	Event (n=14)	P value
Age (years)	45±13,6	46±16,3	0,493
Gender (men)	33	5	0,433
Dialysis vintage (months)	166,45±73,5	186,85±63,62	0,174
PAS (mmHg)	114,21±15,6	111,42±11,67	0,294
PAD (mmHg)	70,27±12,69	67,5±10,51	0,142
PAM (mmHg)	92±12,6	89,8±8,7	0,119
PTH (pg/ml)	427	530	0,273
CT (mg/l)	1,47±0,42	1,36±0,26	0,132
HDLc (mg/l)	0,42±0,13	0,44±0,11	0,9
TG (mg/l)	1,34±0,56	1,12±0,27	0,006
Ca (mg/l)	89±8,7	93±11	0,275
Ph (mg/l)	39±15	47±19	0,435
Hb (g/dl)	10,5±2	10,3±2	0,771

Comparison of Echocardiographic Parameters of Hemodialysis Patients with and without Cardiovascular Events

	Event free (n=70)	Event (n=14)	P value
EF (%)	65±8	64±6	0,15
LVDS	28,65±8	28,42±8,32	0,754
LVDD	46,5±9,46	50,5±5,27	0,183
PWT	10,22±2,34	10,96±2,69	0,759
E/E'	7,37±3	14,07±5	0,004

Kaplan-Meier survival plot of the cardiovascular event-free survival rate during follow-up of 84 hemodialysis patients in a group whose E/E' ratio was ≤15 and in a group whose E/E' ratio was >15.



Multivariate Cox Proportional Hazards Regression Analysis Demonstrating the Relation between Cardiovascular Events and Variables Obtained at Baseline

	HR	95% CI	P VALUE
Index cardiothoracique	0,86	0,17-4,16	0,85
EF (%)	1,02	0,93-1,11	0,65
âge	1,01	0,97-1,05	0,54
LDL	0,01	0,001-1,147	0,58
albumine	0,96	0,84-1,1	0,59
E/E' ratio	1,31	1,16-1,48	0,0001

DISCUSSION

Sharma et al (1) found an association between E/E' ratios >15 and higher all-cause mortality in a study of 125 candidates for kidney transplantation. However, only one-third of the patients were on HD, and only a univariate analysis was performed, which did not allow assessment of whether the E/E' ratio adds prognostic value to the traditional assessment of CV risk in this group. Based on their findings in a study of 220 patients on peritoneal dialysis, Wang et al (22) reported that E/E' ratios >15 predicted all-cause and CV mortality better than the classic clinical echocardiographic data.

Mimura et al (2) found that LV dilatation was significantly more frequent in a CV cause of death group than in a non-CV cause of death group, and that the cross-sectional area of the LV was significantly larger in the CV cause of death group.

Yuko et al (3) assessed one hundred sixty-one subjects. During the follow-up period of 4 years, 64 patients (39.8%) experienced CV events, including acute myocardial infarction, symptomatic angina, heart failure, stroke, and peripheral artery disease. The CV-event group was significantly older, had a higher rate of diabetes, and had higher pulse pressure and lower serum albumin levels than the non-CV-event group. There were no significant differences in gender, dialysis vintage, systolic or diastolic BP, CTR, hemoglobin concentration, serum lipid, calcium, phosphate, or intact PTH levels, or the use of anti-hypertensive agents, lipidlowering drugs, vitamin D, or ESAs between the two groups. The E/E' values in the CV-event group (15.18 ± 5.78) were significantly higher than in the non-CV-event group (12.32 ± 4.23). There were no significant differences between the groups in other echocardiographic parameters. Kaplan-Meier analysis indicated that there was a higher cumulative incidence rate of CV events in the group of patients with LV diastolic dysfunction than in the group without diastolic dysfunction.

CONCLUSION

The results of the present study showed that an elevated E/E' ratio was an independent predictor of CV events in HD patients whose ejection fraction was ≥50%. The measurement of the E/E' ratio may be helpful in hemodialysis patients without any apparent CV disorders to prevent future events and provide therapeutic direction.

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