Carotid Intima–Media Thickness Predicts Dialysis Vascular Access Failure in Hemodialysis Patients : A Prospective Study

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BACKGROUND

- A well-functioning dialysis vascular access is a mainstay to perform an efficient hemodialysis.
- Dialysis vascular access dysfunction is a common cause of morbidity and mortality for the hemodialysis patients.
- Carotid intima–media thickness (cIMT) and carotid plaque are ultrasound imaging that measures carotid atherosclerosis and predicts potential stroke, myocardial infarction, and vascular death.
- Hence, we conducted our study to elucidate the predictive value of cIMT on dialysis vascular access failure from the patients with end-stage renal disease (ESRD) on hemodialysis.

METHODS

Study population

- All hemodialysis patients in Red Cross Hospital within a period of one year were included in the study.

cIMT of the participants

- measured at 6 points of the carotid artery by using the carotid ultrasonography including right and left common carotid artery, right and left bulb and right and left internal carotid artery
- classified in 2 degrees of severity
  - ✓ more than 1.0 mm of maximal cIMT
  - ✓ less than 1.0mm of maximal cIMT

Dialysis vascular access dysfunction

- outcome variables over a median follow-up period of 6 months.

Statistical analysis

- using the statistical package SPSS version 15.0 (SPSS Inc., Chicago, IL, USA).
- $p < 0.05$ was considered statistically significant

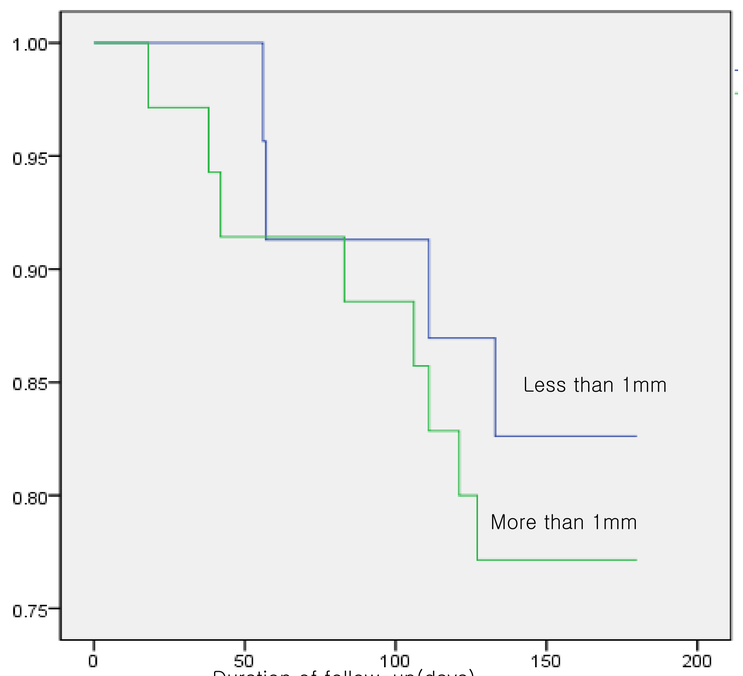
SUMMARY

- Among the 58 cases, 12 events were having dialysis vascular access dysfunction for the 6 months follow-up period.
- The patients with more than 1.0mm of maximal cIMT were older (66.8±10.8 versus 58.4±15.4) with lower albumin than the patients with less than 1.0mm of maximal cIMT.
- The patients with more than 1.0mm of maximal cIMT have more diabetes and previous CV history than the patients with less than 1.0mm of maximal cIMT
- We observed a positive correlation between weight, body mass index, triglyceride, and dialysis vascular access dysfunction.
- Dialysis vascular access dysfunction was significantly often occurred in the patients with more than 1mm of maximal cIMTs than the patients with less than 1mm of maximal cIMT.

RESULTS

Table 1. Dermographic characteristics and laboratory findings in patients with more than 1mm of cIMT and less than 1mm of cIMT

Parameters	<1mm of cIMT (n=23)	≥1mm of cIMT (n=35)	*p*
age (year)	58.4 ± 15.4	66.8 ± 10.8	<0.029
Gender (male %)	16(69.56%)	27(77.14%)	0.553
Body mass index	22.8 ± 4.4	23.6 ± 3.8	0.502
Cause of ESRD (%)			0.052
Diabetes	8(34.8%)	25(71.4%)	
Glomerulonephritis	6(26.1%)	4(11.4%)	
Hypertension	2(8.7%)	1(2.9%)	
others	2(8.7%)	0(0.0%)	
unknown	5(21.7%)	5(14.3%)	
HD duration (Day)	19727.8 ± 5755.2	23422.7± 5192.7	0.120
BMI	22.8 ± 4.4	23.6 ± 3.8	0.502
Hypertension	21(91.3%)	31 (88.6%)	1.000
Diabetes	10(43.5%)	27 (77.1%)	0.013
Previous CV history	4(17.4%)	18 (51.4%)	0.013
Laboratory data			
Hemoglobin (g/dL)	11.1 ± 1.4	10.6 ± 1.5	0.227
BUN (mg/dL)	53.0 ± 14.5	48.6 ± 22.5	0.416
Creatinine (mg/dL)	8.7 ± 2.9	7.3 ± 2.9	0.090
Protein (mg/dL)	6.7 ± 0.4	6.5 ± 0.5	0.160
albumin (mg/dL)	3.9 ± 0.4	3.7 ± 0.5	0.020
Sodium (mg/dL)	137.4± 3.0	138.2 ± 3.0	0.326
Potassium (mg/dL)	4.7 ± 0.6	4.6 ± 0.7	0.773
Phosphorus (mg/dL)	4.2 ± 1.3	4.1 ± 1.1	0.652
Calcium (mg/dL)	8.4 ± 0.5	8.3 ± 0.8	0.757
hsCRP (mg/dL)	1.3 ± 2.9	0.7 ± 1.2	0.254
Total cholesterol	143.5 ± 23.3	148.0 ± 30.8	0.553
LDL-cholesterol	75.1 ± 20.1	79.3 ± 27.6	0.536
HDL-cholesterol	48.8 ± 11.7	44.5 ± 12.5	0.195
Triglyceride	97.8 ± 42.2	120.5 ± 61.2	0.126
Intact PTH (pg/mL)	150.5 ± 108.2	117.9 ± 89.0	0.218
Beta 2 microglobulin	18.1 ± 3.1	16.5 ± 4.6	0.127



Figuer 1 Kaplan–Meier curves according to patients with more than 1mm of cIMT and less than 1mm of cIMT show event free survival of vascular access dysfuction.(p=0.03)

CONCLUSION

- Our results show that dialysis vascular access dysfunction may be associated with the maximal cIMT.
- Therefore, the measurement of cIMT may have an advantage for prediction of dialysis vascular access dysfunction in hemodialysis patients.

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