Poster#MP579

The Prevalence of Vascular Calcification in Chinese Patients with Chronic Kidney Disease on Dialysis: Baseline Results from a National Multi-center Observational Cohort Study

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Introduction

Chronic kidney disease (CKD) is an important global public health issue. In China CKD affects around 120 million people with an overall prevalence of 10.8%.[1] This is similar to the estimated prevalence in the United States (13.1%) and within the range recently reported across European countries (3–17%).[2, 3] Vascular calcification (VC) is a common complication of CKD and is associated with an increased risk of cardiovascular disease (CVD) and all-cause mortality in patients with end-stage renal disease (ESRD) on dialysis.[4] Data on VC prevalence and management in Chinese patients on dialysis are limited, leading to sub-optimal awareness, prognosis and dialysis management.

Study aim

The China Dialysis Calcification Study (CDCS) is the first large, observational study conducted in China to investigate the prevalence and predictive value of VC and its burden on patients with ESRD on dialysis.

Methods

- The CDCS is a nationwide, multi-center, non-interventional, 24-month prospective study. The study methods have previously been described in detail.[5]
- The study included adult (≥18 to <75 years) patients with ESRD receiving hemodialysis (HD) or peritoneal dialysis (PD) for ≥6 months, who provided written informed consent.
- Patients were assessed at Baseline and at four 6-monthly follow-ups.
- Planned total enrolment was 1520 patients across approximately 25 study sites.
- Primary evaluation criteria were baseline prevalence of:
  - coronary artery calcification (CAC) measured by electron beam computed tomography (EBCT) or multi-detector computed tomography (CT) using the Agatston score
  - abdominal aortic calcification (AAC) assessed by plain lateral lumbar radiograph using the Kauppila score
  - cardiac valve calcification measured by echocardiography
- Total VC was defined as confirmed presence of VC in ≥1 location (CAC, AAC or cardiac valve calcification).
- Patients included in the present analysis were all eligible patients who had at least one of the three VC evaluation images at Baseline.
- The Baseline Calcification Data Completed (BCDC) population was defined as patients with all three VC images.
- This poster reports results from a planned interim analysis of baseline VC, conducted once enrolment was complete.
- The study was sponsored by Sanofi and registered at the Chinese Clinical Trial Registry (ChiCTR-OCH-14004447).

Results

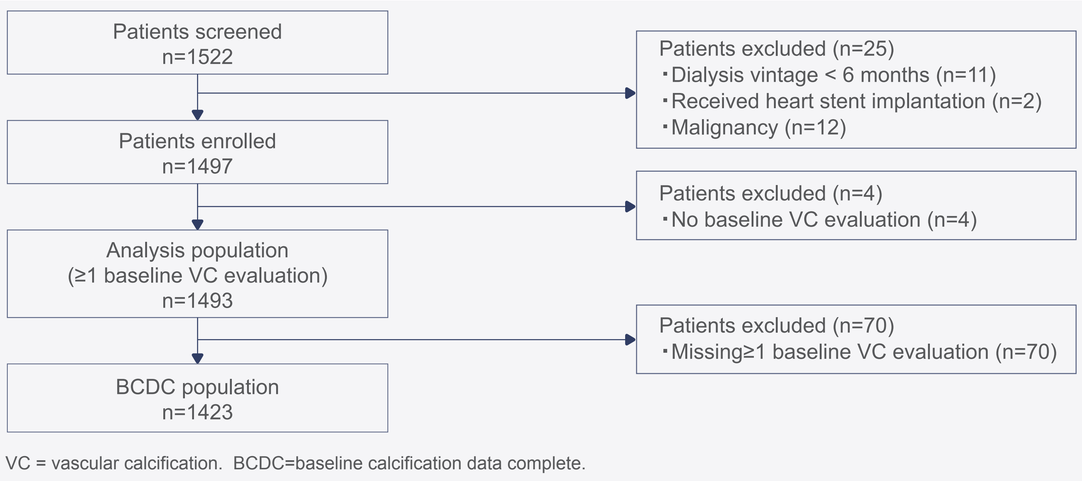
Patients

A total of 1522 patients were screened and 1497 entered the study across 24 centers between May 2014 and April 2015. Four patients did not undergo any baseline VC imaging; therefore the analysis included 1493 patients. The BCDC population included 1423 patients who underwent all three VC imaging measurements (The data presented in this poster have been updated from the abstract; additional patients were excluded from the analyses after final data cleaning) **(Figure 1)**.

Compared with patients on PD, those on HD had a higher mean age (51.1 vs. 47.0 years), a greater proportion were male (62.0% vs. 50.3%) and the mean dialysis vintage was higher (4.9 vs. 3.4 years) **(Table 1)**.

Among all patients included in the analysis, the most common causes of CKD were chronic glomerulonephritis, diabetes, and hypertension (52.0%, 15.5% and 10.7%, respectively) **(Figure 2)**. A similar result was observed when patients were stratified by HD and PD.

Figure 1. Patient flow diagram



VC = vascular calcification. BCDC=baseline calcification data complete.

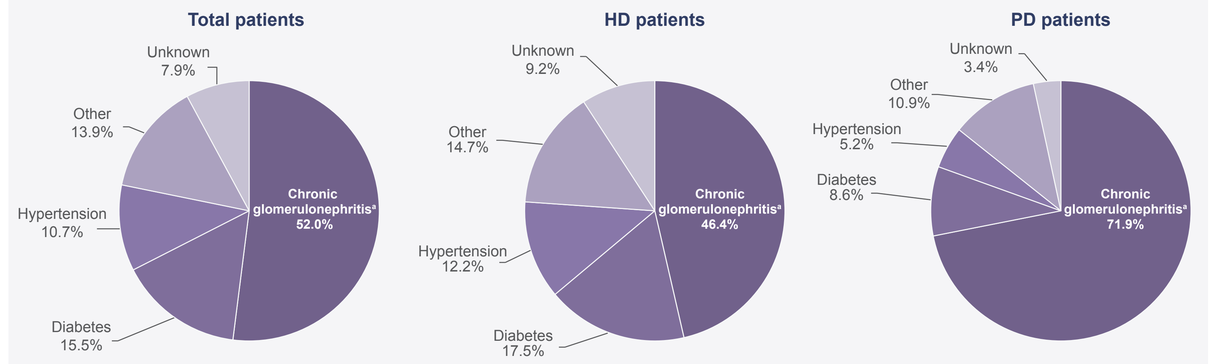
Table 1. Patient demographics and baseline characteristics

Variable[a]	All patients (n=1493)	HD (n=1169)	PD (n=324)
Age, years	50.2 ± 12.5	51.1 ± 12.3	47.0 ± 12.9
Male, n (%)	888 (59.5)	725 (62.0)	163 (50.3)
Height, cm	165.3 ± 8.0	165.5 ± 8.1	164.5 ± 7.9
Weight, kg	61.6 ± 12.1	62.1 ± 12.5	59.4 ± 10.4
Dialysis vintage, years	4.6 ± 3.8	4.9 ± 4.1	3.4 ± 2.1

HD = hemodialysis; PD = peritoneal dialysis

[a]Continuous variables are summarized as mean ± standard deviation unless otherwise stated

Figure 2. Etiology of CKD in all patients (n=1493), patients on HD (n=1169) and patients on PD (n=324)



HD = hemodialysis; PD = peritoneal dialysis

[a]Chronic glomerulonephritis includes glomerulonephritis, chronic nephritis, IgA nephropathy, membranous nephropathy and glomerulus disease

Vascular calcification prevalence

Overall, 77.4% of patients had total VC, and 68.3%, 46.8% and 29.0% had CAC, AAC and cardiac valve calcification, respectively **(Table 2)**.

Compared with patients on PD, those on HD had a significantly higher prevalence of total VC (80.8% vs. 65.1%; P<0.001) and CAC, AAC and cardiac valve calcification **(Table 2)**.

Table 2. Summary of vascular calcification prevalence in Chinese patients with ESRD on dialysis

Variable	All patients (n=1493)	HD (n=1169)	PD (n=324)	P-value[a] (HD vs. PD)
VC prevalence, % [95% CI] (n[b])				
Total[c]	77.4 [75.2–79.5] (1493)	80.8 [78.5–83.1] (1169)	65.1 [59.7–70.3] (324)	<0.001
CAC	68.3 [65.8–70.6] (1478)	72.1 [69.4–74.7] (1158)	54.4 [48.7–59.9] (320)	<0.001
AAC	46.8 [44.2–49.4] (1440)	50.1 [47.1–53.0] (1134)	34.6 [29.3–40.3] (306)	<0.001
Cardiac valve calcification	29.0 [26.7–31.4] (1488)	31.3 [28.6–34.0] (1167)	20.9 [16.6–25.7] (321)	<0.001

AAC = abdominal aortic calcification; CAC = coronary artery calcification; HD = hemodialysis; PD = peritoneal dialysis; VC = vascular calcification

[a]P-values calculated using a chi-squared test; [b]patients with available vascular calcification measurement; [c]patients may have had multiple categories of vascular calcification

Distribution of vascular calcification in the BCDC population

In the BCDC population, the most common distributions of calcification were CAC + AAC (23.4%), isolated CAC (20.0%), and CAC + AAC + cardiac valve calcification (17.9%) **(Table 3)**. Compared with patients receiving PD, those receiving HD had a higher prevalence of calcification in multiple locations.

Table 3. Calcification distributions in the BCDC population

Calcification location(s), n (%)	BCDC[a] (n=1423)	BCDC[a] HD (n=1122)	BCDC[a] PD (n=301)
CAC only (no AAC, no cardiac valve calcification)	285 (20.0)	224 (20.0)	61 (20.3)
CAC + AAC (no cardiac valve calcification)	333 (23.4)	273 (24.3)	60 (19.9)
CAC + cardiac valve calcification (no AAC)	92 (6.5)	80 (7.1)	12 (4.0)
CAC + AAC + cardiac valve calcification	255 (17.9)	224 (20.0)	31 (10.3)
AAC only (no CAC, no cardiac valve calcification)	61 (4.3)	49 (4.4)	12 (4.0)
AAC + cardiac valve calcification (no CAC)	16 (1.1)	15 (1.3)	1 (0.3)
Cardiac valve calcification only(no CAC, no AAC)	61 (4.3)	40 (3.6)	21 (7.0)
No calcification	320 (22.5)	217 (19.3)	103 (34.2)

AAC = abdominal aortic calcification; BCDC = Baseline Calcification Data Completed; CAC = coronary artery calcification; HD = hemodialysis; PD = peritoneal dialysis

[a]The Baseline Calcification Data Completed population only includes patients with available baseline imaging measurements for AAC, CAC and cardiac valve calcification

Conclusions

The prevalence of VC among Chinese patients with ESRD on dialysis is 77.4%, which is comparable to rates reported in Europe and North America (70–90%), and is significantly higher in patients on HD versus PD.

The association between VC and CVD, and CKD management and the development of both VC and CVD, will be investigated in subsequent analyses of the CDCS.

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