The effects of in-center nocturnal haemodialysis on left ventricular remodelling: results from the MIDNIGHT study.

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Background

There is increasing evidence that extended hours haemodialysis (HD) is associated with improved patient outcomes, including cardiovascular (CV) related outcomes. In-center nocturnal haemodialysis (INHD) is an established, though often unavailable, way of offering extended hours HD to patients and is a useful way of offering extended-hours dialysis to patients unable to undertake home-based dialysis programs.

The graded relationship between left ventricular (LV) mass and outcome is well established and cardiac MRI (CMR) is the the gold-standard for measurement of LV mass and volumes. The additional value of CMR lies in it's multi-parametric nature and new, non-contrast, sequences allow analysis of myocardial tissue, fibrosis, myocardial strain and aortic function in a single scan.

In this non-randomized controlled feasibility study (ISRCTN16672784), we assessed the effect of 6 months INHD on cardiovascular structure and function in prevalent HD patients compared to a control group (CD).

Methods

Twelve patients were recruited from those who had electively planned to switch from CD to INHD. A control group matched for age, gender and dialysis vintage were recruited from patients that remained on CD. Patients underwent CMR scan (figure 1) at the start and end of the study.

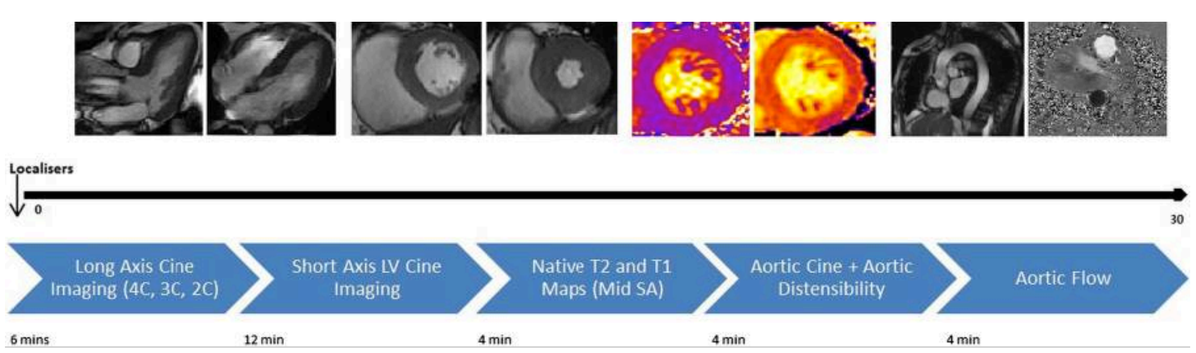

Figure 1: *CMR study protocol.*

Initial dialysis time was 300 minutes, increasing up to a maximum of 480 minutes as tolerated throughout the six-month period of intervention.

The control group underwent routine clinical care, dialysing for 240 minutes 3 times per week. Dialysis-related clinical targets were the same for both groups and were to the UK Renal Association guidelines.

Table 1: *Patient demographics.*

	INHD group (n=13)	CD group (n=12)
Age; years (mean)	51	61
Gender- Male; n(%)	11 (85)	10 (83)
HD Vintage; months (mean)	34.3	39.4

Patient baseline demographics are shown in table 1. Mean dialysis duration was 410±86min in the INHD group.

Results

Overall 25 patients were recruited (INHD=13, CD=12). Reasons for dropout included: Transplant (n=2 from INHD), consent withdrawn (n=1 from INHD, n=2 from CD),declined final CMR (n=2 from INHD), excluded due to non-standard HD regimen (n=1 from CD).

Patients included in final CMR analysis: INHD n=8; CD n=9

There were trends towards improvements in aortic pulse wave velocity and systolic strain, though not to significance. Changes in CMR parameters are shown in table 2:

Table 2: *CMR outcome measures.*

		INHD (mean ± SD)	CD (mean ± SD)	P-Value
LVM (g)	Baseline	121±50	95±20	0.02
	End of Study	106±46	102±27	
LVEDV (ml)	Baseline	179±57	166±48	0.90
	End of Study	171±51	157±37	
LVM/LVEDV (g/ml)	Baseline	0.67±0.11	0.59±0.11	0.01
	End of Study	0.60±0.09	0.65±0.07	
LVEF (%)	Baseline	50.5±7.5	54.0±5.5	0.11
	End of Study	54.2±6.6	53.8±5.5	
Native T1 (ms)	Baseline	1272±21	1270±47	0.05
	End of Study	1241±25	1270±35	

Figures 2 and 3 show the relative changes in global, septal and non-septal native T1 between groups and the relationship between changes in LVM and native T1.

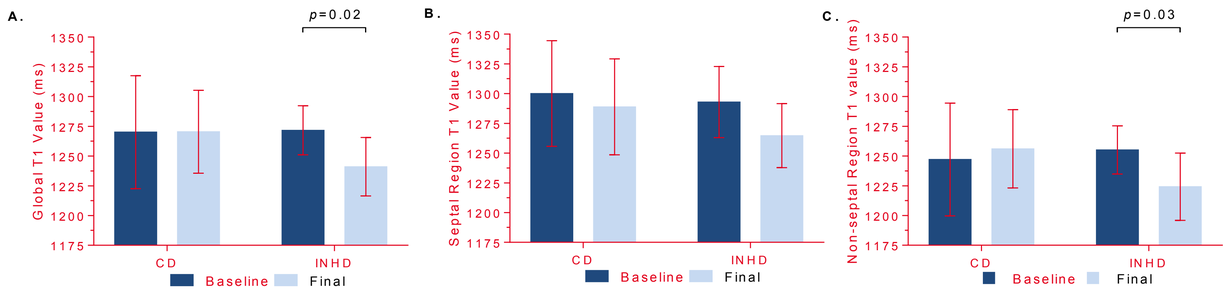

Figure 2: *Global and regional changes in native T1 between groups*

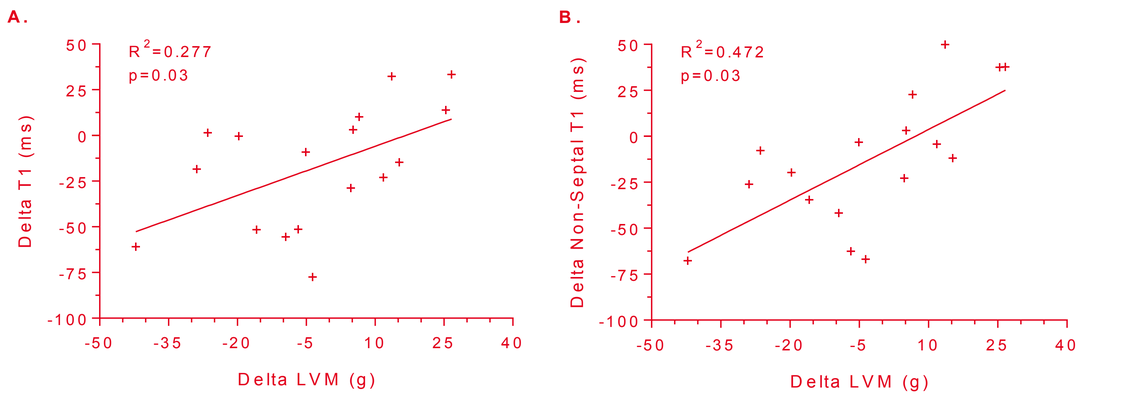

Figure 3: *Relationship between changes in native T1 and LVM*

Conclusion

A six-month program of extended hours INHD was associated with a reduction in LV mass and favourable LV remodelling. The reduction in native T1 mapping in INHD patients suggest a reduction in myocardial fibrosis compared to control patients who remained on thrice weekly, 4-hour HD. These data merit testing in future larger trials of INHD.

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Dialysis - Cardiovascular complications I

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