Echocardiographic and Clinical Characteristics Cross-Sectional Study in Association with Thai Peritoneal Dialysis Patients: Data from a Single Center Study

Teeranan Angkananard MD*,
Siribha Changsirikulchai MD*, Jirayut Janma MD*,
Thanapath Wannasiri BSc*, Piyathida Sangthong BSc*

** Department of Medicine, Faculty of Medicine, Srinakharinwirot University, Nakhon Nayok, Thailand*

Background: *The dialysis patients have a lot of changes in cardiac structure and function detected by echocardiography and they have been recognized as key outcome predictors. However, the available data regarding echocardiographic alterations in Thai Continuous Ambulatory Peritoneal Dialysis (CAPD) patients is limited. This study aimed to determine the correlation between baseline clinical and echocardiographic characteristics of Thai CAPD patients.*

Material and Method: *This study was a single center and cross-sectional observational study, which enrolled all CAPD outpatients (104 patients), treated at Srinakharinwirot Medical University between 1 September 2012 and 31June, 2014. Their demographic and echocardiographic data were collected one time and the latest laboratory data to the patient's echocardiographic study date were analyzed.*

Results: *One hundred and four patients (50 men and 54 women) whose mean age was 59.4±12.7 years and median duration of CAPD was 12 months were recruited. An extremely high prevalence of elevated left ventricularmass index (LVMI), 82.7% was found which mean LVMI was higher in male than female (166.2±55.6 vs. 131±47.6 g/m^2). All patients had diastolic dysfunction and most of them had diastolic dysfunction grade I. The study factors of male gender, history of hypertension, high serum phosphate, low hemoglobin level, corrected QT interval, and duration of CAPD longer than 24 months can predict the variation of LVMI. Interestingly, the study found that a duration of CAPD of longer than 42 months might reduce right ventricular systolic pressure.*

Conclusion: *This study revealed a higher prevalence of left ventricular hypertrophy (LVH) in Thai CAPD patients when compared with previous studies and anemia still be an important independent factor for developing LVH. Longer period of CAPD may regress LVH and lower RVSP that should be proven by longer well-designed prospective studies.*

Keywords: *Peritoneal dialysis, Echocardiography, Left ventricular hypertrophy, Pulmonary hypertension, End-stage renal disease (ESRD), Continuous ambulatory peritoneal dialysis (CAPD), Thai*

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Chronic kidney disease (CKD) is a risk factor for cardiovascular disease[1-3] and the risk of cardiovascular death increases further for GFR values <45 ml/min/1.73 m^2[3]. Cardiovascular disease is also the most important cause of death in patients with end-stage renal disease (ESRD) who are on chronic dialysis in the US and Europe. This accounts for 40% of all deaths in patients on dialysis in the US and 36% of such deaths in Europe[4,5]. Malnutrition and protein-energy wasting[6-10], inflammation[11-14], calcification[15-18] and vitamin D[19] were studied and found to be the potential factors for the association between ESRD and cardiovascular mortality. A large cohort study of patients on peritoneal dialysis has clearly established that patient's survival is linked with the magnitude of residual renal function and urine volume[20]. Ultrafiltration failure and overhydration have also been reported as risk factors for cardiovascular events[21-26].

There are many changes in cardiac structure and function detected by echocardiography, which are

Correspondence to:
Angkananard T, Division of Cardiology, Department of Medicine, Faculty of Medicine, HRH Princess Maha Chakri Sirindhorn Medical Center, Srinakharinwirot University, 62 Ongkharak, Nakhon Nayok 26120, Thailand.
Phone: +66-37-395085
E-mail: theeranat89@yahoo.com

commonly found in the dialysis patients and have been recognized as key outcome predictors[27]. The left ventricular hypertrophy (LVH) is highly prevalent in CKD and is associated with unfavorable prognosis. Severe LVH was found in a third of Thai patients on continuous ambulatory peritoneal dialysis (CAPD). This has been associated with a high cardiovascular morbidity and mortality[28]. More than two-thirds of the patients undergoing dialysis with LVH died from congestive heart failure or sudden death. In studies using different methodologies, the prevalence of the LV systolic dysfunction varied from 15% to 18% in patients undergoing dialysis (starting the treatment[29] or those on chronic dialysis[30]). Studies with small sample sizes have reported a prevalence of LV diastolic dysfunction in uremic patients varying from 50 to 65%. These included pre-dialysis, dialysis and post-transplant patients[27].

Furthermore, there has been strong evidence that indicates left atrium (LA) dilatation as a robust predictor of cardiovascular outcomes in the general population and in multiple clinical scenarios[31]. That has been confirmed in a recent study that LA volume index (LAVI) is an emerging cardiovascular risk factor for CKD patients[32]. In addition, the uremic patients who have valvular calcification will have higher risk for mortality and cardiovascular events[15]. The prevalence of valvular calcification ranged from 32% to 47% in PD patients[33,34]. This contrasts with 19% to 84% found in patients on hemodialysis. A recent preliminary study about right ventricular (RV) function also demonstrated that tricuspid annular plane systolic excursion (TAPSE) index may be an early echocardiographic marker of cardiac involvement in atherosclerosis[35]. The RV dysfunction is associated with chronic kidney disease (CKD) and can predict survival for outpatients with chronic systolic heart failure[36]. ESRD patients with severe left ventricular systolic dysfunction who initiate peritoneal dialysis (PD) lead to substantial improvements in functional status, blood pressure control and isotopic left ventricular ejection fraction[37]. One study from Hong Kong has shown that the proportion of cardiovascular deaths seen in PD patients rose from 27% in 1996 to 42% in 1998[38]. However, the information available in the literature regarding echocardiographic alterations in Thai PD patients is limited.

Objective

The primary objective of the present, cross-sectional study is to evaluate the relationship between baseline clinical and echocardiographic characteristics in PD patients at the Her Royal Highness Princess Maha Chakri Sirindhorn Medical Center, Srinakharinwirot University Medical School Hospital, Ongkharak, Nakhon Nayok, Thailand.

Material and Method

Study population

The male and female outpatients aged ≥18 years old who have treated with peritoneal dialysis between the period 1st of September 2012 and 31st of June 2014, were recruited consecutively from the CAPD clinic of Her Royal Highness Princess Maha Chakri Sirindhorn Medical Center & Hospital. We excluded the patients who had clinical of heart failure, chronic lung disease, chronic liver disease, pulmonary embolism, valvular heart disease, congenital heart disease, acute coronary syndrome, scleroderma, systemic lupus erythematosus, received PD treatment <15 days and had infected PD fluid. Eligibility criteria were verified by the physicians involved in this study. All patients have given their written informed consent before starting the protocol.

We collected the demographic data, which consisted of age, race, gender, clinical data including collected the body mass index (BMI), body surface area (BSA), history of diabetes, hypertension, hyperlipidemia, known coronary artery disease (CAD) and pulmonary disease.

We also gathered data on the duration of PD therapy, current medication, smoking history, alcohol use, systolic blood pressure (SBP) and diastolic blood pressure (DBP) levels. Laboratory parameters of hemoglobin level, serum albumin as measured by bromcresol green method, total calcium, phosphate and estimated Glomerular Filtration Rate (eGFR) using the simplified Modification of Diet in Renal Disease (MDRD) study equation[39] were analyzed. The corrected QT interval (QTc) was calculated with 12-lead electrocardiography (ECG) using Bazett's formula. The trans-thoracic echocardiography (TTE) data were also collected in the same day. The laboratory data of patients closest to the date of the TTE study were used in this analysis. The patients had undergone TTE by one cardiologist (first author) and two sonographers (the last two authors) using the Philip iE33 xMATRIX echocardiography system by the criteria set forth by the American Society of Echocardiography[40-42] in demonstrating the presence and the severity of LVH, LV dilatation, LV systolic and diastolic function. These were determined by mitral

inflow criteria, left atrial volume index (LAVI), right ventricular systolic and diastolic function, pulmonary systolic pressure or right ventricular systolic pressure (RVSP) and valvular and annular calcification of the mitral and the aortic valves[43]. Valvular and annular calcification of both mitral and aortic valves were combined into one composite phenotype. The composite phenotype is defined as "at least one affected valve/annulus from their assumed sharing pathogenesis and atherosclerotic risk factors". Echocardiographic parameters of interventricular septum diastolic thickness (IVSDT), left ventricular posterior wall diastolic thickness (LVPWDT), and left ventricular end-diastolic diameter (LVEDD) were measured at end-diastole. Ventricular dimensions were assessed through 2-D guided M-mode tracings. Left ventricular mass was calculated by use of the Devereux formula[44]. LVH was diagnosed according to the update recommendation from the American Society of Echocardiography and the European Association of Cardiovascular Imaging[42]. The formula of LV mass index (LVMI) by linear measurement is shown below:

$$\text{LVMI } (g/m^2) = \frac{0.8 \times 1.04\ [(\text{LVEDD} + \text{IVSDT} + \text{LVPWDT})^3 - (\text{LVEDD})^3] + 0.6}{\text{BSA}}$$

(Reference upper limits of normal LVMI by linear measurement: 95 g/m^2 in women and 115 g/m^2 in men[42])

To define pulmonary arterial hypertension (PAH), owing to right heart catheterization was not performed in this study, we only used the echocardiographic data and classified the patients as PAH when RVSP $\geq$36 mmHg, together with mean pulmonary artery pressure (mPAP) $\geq$25 mmHg, E/e' <8 and LA volume index (LAVI) $\leq$28 ml/m^2 after excluding left sided heart disease, congenital heart disease, AV fistula, thrombus in atrium or pulmonary artery[45]. Peritoneal membrane function was assessed using a standard peritoneal equilibration test (PET) and the dialysis adequacy was shown as total weekly Kt/V of urea.

Statistical analysis

Intra- and inter-observer reliability of TTE were analyzed before the initiation of the study for concurrent validity with a repeated measure analysis of variance (ANOVA) to calculate the intra-class correlation coefficients (ICCs) with a 95% confidence interval. This ICCs ranged from 0.44 to 0.58 which is considered as moderate agreement[46]. The continuous data was expressed as mean $\pm$ standard deviation (SD) if normally distributed, or median (interquartile range) if non-normally distributed. The categorical variables were presented as frequency and percentage and analyzed using Chi-square test or Fisher's exact test. The univariate and multivariate linear regression analysis was performed to explore the association of LVH and PAH. The significant alpha level was set at 0.05 for all analyses. All statistical analysis was done using STATA 13.1 software.

Results

The 104 patients, 50 males and 54 females, who averaged 59.4 ($\pm$12.7) years of age were included in this study. The median duration of time in PD was 12.0 months for all patients. The minimum and maximum time of PD were 3.3 and 24 months, respectively. Female patients had a higher age than was seen in the males (61.9$\pm$12.2 vs. 56.8$\pm$12.8 years of age, $p = 0.04$). The mean BMI was 24.2 ($\pm$3.6) kg/m^2 and classified as normal body weight (36.5%), overweight (24.1%) and obese (39.4%). Majority of the patients have sinus rhythm (92.3%). The PD adequacy was assessed by the weekly Kt/V urea was 1.7 (1.4, 2.1).The baseline clinical characteristics and biochemical parameters are shown in Table 1 and echocardiographic finding was illustrated in Table 2.

There was a high prevalence of elevated LVMI or LVH in both genders (82.7%) as shown in Table 2. It was as high as 55.6% in males and 47.6% in females. There was a linear positive correlation in BSA (+0.26) and serum phosphate (+0.37) in the LVMI. There was a negative correlation in age (-0.24), duration of CAPD (-0.19), hemoglobin (Hb) level (-0.33), serum calcium (-0.21) as seen in Table 4. Additionally, there were high percentages of LV dilatation (76%) and prolonged corrected QT intervals (62.5%). All patients had diastolic dysfunction in which classified in diastolic dysfunction grade I (72.1%), grade II (16.3%) and grade III-IV (0.07%). In the case of valvular and annular calcification, most patients had only mild degrees of calcification; 87.5% of mitral and 89.4% of aortic valves.

Right ventricular (RV) function was also evaluated according to guidelines for the echocardiographic assessment of the right heart in adults[40] and found that overall RV systolic function was in normal range which only seven patients were found to have systolic dysfunction. However, nearly half of the patients had RV diastolic dysfunction (42 patients; 40.8%).

Multivariate analysis

Multiple linear regression analysis was performed to find out the predictors of LV mass index

Table 1. Baseline clinical characteristics and biochemical parameters (n = 104)

Characteristics	n (%)
Gender	
Male	50 (48.1)
Age; year; mean (SD)	59.4 (12.7)
Male	56.8 (12.8)
Female	61.9 (12.2)
Body mass index; kg/m^2; mean (SD)	24.2 (3.6)
Body surface area (BSA); m^2; mean (SD)	1.6 (0.2)
Diabetes	64 (61.5)
Hypertension	102 (98.1)
Hyperlipidemia	79 (75.9)
Previous history of CAD	20 (19.2)
Smoking	23 (22.1)
Pulmonary disease	2 (0.02)
Medication	
ACEIs	45 (43.3)
ARB	28 (26.9)
Beta-Blocker	44 (42.3)
Calcium channel blocker	79 (75.9)
Statin	74 (71.2)
Anti-platelets	
Aspirin	30 (28.9)
Clopidogrel	21 (20.2)
Nitrate	21 (20.2)
Duration of CAPD; months; median (IQR 25,75)	12 (3.25,24)
SBP; mmHg; mean (SD)	151.1 (23.2)
DBP; mmHg; mean (SD)	82.7 (12.7)
Hb; g/dl; mean (SD)	10.4 (1.8)
GFR (MDRD); ml/min/1.73 m^2; median (IQR 25,75)	5.9 (4.5,7.5)
Serum albumin; g/dL; mean (SD)	3.4 (0.5)
Serum calcium; mg/dL; mean (SD)	8.4 (0.9)
Serum phosphate; mg/dL; mean (SD)	4.8 (1.5)
Rhythm	
Sinus	96 (92.3)
Atrial fibrillation	8 (7.7)
Corrected QT (QTc) interval; msec; mean (SD)	459.7 (43.0)
Prolonged QTc**	65 (62.5)

** QTc interval ≥440 msec.

Table 2. Echocardiographic characteristics

Characteristics	Mean (SD)
LA diameter; mm	43.7 (6.6)
LA volume index (LAVI); ml/m^2	38.2 (18.4)
Left ventricular end diastolic diameter (LVEDD); mm	49.4 (8.3)
Left ventricular end systolic diameter (LVESD); mm	32.9 (8.4)
Inter ventricular septum in diastole (IVSd); mm	11.9 (2.5)
Posterior Wall in diastole (PWd); mm	12.3 (2.1)
LV mass index; g/m^2	
Male	166.2 (55.6)
Female	131.6 (47.6)
Left ventricular hypertrophy (LVH)*; %	86 (82.7)
LVEF; %	
Teichholz	61.9 (11.9)
Modified simpson's biplane	59.4 (10.9)
MV E/A	0.9 (0.6)
MV deceleration time (DT); msec	256.7 (89.6)
RVSP; mmHg	42.9 (14.1)
Mean PA pressure; mmHg	28.2 (8.6)
RA diameter; mm	26.2 (6.3)
RV diameter; mm	30.2 (7.5)
RV wall thickness; mm	4.7 (1.1)
Tricuspid annular plane systolic excursion (TAPSE); cm	2.3 (0.5)
Tissue Doppler–derived tricuspid lateral annular systolic velocity (S'); cm/s	14.9 (4.2)

* Defined as LVMI by linear measurement exceeded 95 g/m^2 in women and 115 g/m^2 in men.
RV diameter was measured at mid cavity of RV at end-diastole. RA diameter was measured in the apical four-chamber view as the distance between the lateral RA wall and interatrial septum, at the mid-atrial level defined by half of RA long axis.

and RVSP. We found that male gender, presence of hypertension, high serum phosphate level, low hemoglobin level, corrected QT interval, and duration of CAPD longer than 24 months can predict the variation of LV mass index as the parsimonious equation below with the adjusted coefficient of multiple determination (adjusted R^2) equal to 0.3317. This means that after adjusting the numbers of the predictors, 33.17% of the variation of LV mass index is explained by its linear relationship with the sex, presence of hypertension, serum phosphate, hemoglobin level, corrected QT interval, and duration of CAPD longer than 24 months.

For analysis of the predictors of RVSP, we discovered that level of SBP, LAVI, MV deceleration time, MV E/A, and duration of CAPD longer than 42 months as the predictors. After adjusting the numbers of the predictors, 46.39% of the variation of RVSP is explained by its linear relationship as shown below (adjusted $R^2 = 0.4639$).

LV mass index = $-14.62+10.14x(PO_4)+26.66x(male)-6.96x(Hb)+67.99x(HT)+0.25x(QTc) - 22.18x$ (duration of

Table 3. Baseline characteristics comparing between the patients with and without LVH

Characteristics	LVH n = 72 (69.2%)	No LVH n = 32 (30.8%)	*p*-value
Age; year; mean (SD)	58.8 (13.8)	60.8 (9.8)	0.466
Male	32 (34.6)	18 (15.4)	0.266
BMI; kg/m^2; mean (SD)	24.5 (3.6)	23.6 (3.7)	0.255
BSA; m^2; mean (SD)	1.6 (0.2)	1.6 (0.2)	0.365
D M	41 (44.3)	23 (19.7)	0.149
Hypertension	72 (70.6)	30 (31.4)	0.032*
Hyperlipidemia	55 (54.7)	24 (24.3)	0.878
Duration of CAPD (months); median (IQR)	10 (2.5, 21)	14.5 (9.5,41)	0.028*
SBP; mmHg; mean (SD)	151.7 (22.5)	149.7 (24.9)	0.674
DBP; mmHg; mean (SD)	82.6 (12.9)	83 (12.3)	0.877
Hemoglobin; g/dL; mean (SD)	9.9 (1.7)	11.3 (1.7)	0.002*
BUN; mg/dL; mean (SD)	57.2 (17.9)	53.4 (23.1)	0.360
Serum creatinine; g/dL; mean (SD)	9.2 (3.2)	8.3 (2.8)	0.217
Serum albumin; g/dL; mean (SD)	3.4 (0.6)	3.6 (0.5)	0.060
Serum calcium; g/dL: mean (SD)	8.4 (1.0)	8.5 (0.7)	0.421
Serum phosphate; g/dL; mean (SD)	4.9 (1.5)	4.4 (1.3)	0.097
Corrected QT interval; msec; mean (SD)	464.9 (45.0)	447.9 (36.0)	0.064
LAVI; ml/m^2; mean (SD)	41.0 (19.0)	31.7 (10.4)	0.012*
MV E/A; median (IQR)	0.8 (0.6, 1.2)	0.6 (0.6, 0.8)	0.099
MV E/e'; mean (SD)	20.0 (8.6)	15.4 (7.3)	0.014*
RVSP; mmHg; mean (SD)	44.7 (14.2)	38.6 (12.9)	0.045*

* considered to be significant

Table 4. Correlation between LVMI and clinical and laboratory parameters

Parameters	r	*p*-value
BSA (m^2)	+0.26	0.009
Age (year)	-0.24	0.016
Duration of CAPD (months)	-0.19	0.042
Hb level (g/dL)	-0.33	<0.001
Serum calcium (g/dL)	-0.21	0.036
Serum phosphate (g/dL)	+0.37	<0.001

PD >24 months)
RVSP = 24.17+0.29x(LAVI)-0.05x(MV DT)+0.10x(SBP)+ 4.84x(MV E/A) -7.17x (duration of PD >42 months)

Surprisingly, eccentric LVH was detected in only 24% and LV dilatation could not be revealed in the patients without LVH. There was linear association between hemoglobin level in negative correlation (r = -0.24), serum calcium in negative correlation (r = -0.28) and LA dilatation evaluated by LAVI in positive correlation (r = +0.26) with corrected QT interval in this study (data are not shown in the table).

Additionally, the prevalence of PAH was estimated about 27.2% and there was good correlation between PAH and high level of systolic blood pressure (r = +0.24), serum creatinine (r = +0.20), serum phosphate (r = +0.29), LV end diastolic diameter (r = +0.48), LVMI (r = +0.53) and low level of hemoglobin (r = -0.21) and serum calcium (r = -0.23) (data are not illustrated in the table).

Lastly, dialysis efficiency data, which was evaluated by Kt/V, was about 50% missing, therefore we did not analyze these data with other factors in the final analysis.

Discussion

This cross-sectional study investigated the correlation between baseline clinical and echocardiographic characteristics of Thai CAPD patients and found that there was a high prevalence of LVH as high as 82.7% in which higher than the previous studies that reported 45.2%[47] and 44%[48]. Most patients with LVH did not have left ventricular dilatation. This probably resulted from high percentage of anemia (43.3% of patients have Hb <10 g/dl) found in the patients with LVH (mean Hb was 9.9$\pm$1.7 g/dl). This was as similar to results in previous studies[49], which

reported that conventional hemoglobin target for erythropoietin therapy in the ESRD patients with Hb <10 g/dl was associated with a reduction in LVMI. Additionally, most ESRD patients in our center not only delayed to initiate peritoneal dialysis but to get erythropoietin therapy. It may result from the Thai national health policy for erythropoietin therapy, which states that this can only be given in ESRD patients who have already registered and initiated dialysis.

LVH occurred from adaptive remodeling process, compensating for an increase in workload placed on the heart to minimize the ventricular wall stress. LVH has a prevalence of approximately 40% in patients with chronic renal insufficiency and increases to about 75% by the onset of ESRD[50,51]. It is also considered as an important risk factor for some important cardiac problems such as atrial fibrillation, systolic and diastolic heart failure and sudden death in patients with hypertension. Multiple known risk factors for LVH in patients with chronic renal insufficiency are older age, arterio-venous connections, diabetes mellitus, hypertension, anemia, abnormally large stiff arteries, extracellular fluid volume expansion, uremic internal milieu, and abnormalities of calcium phosphate homeostasis in which similar to our study. Interestingly, we discovered that the duration of CAPD longer than 24 months may reduce LVMI about 22.18 g/m^2 per 1 month. Contrarily, the previous study concluded that CAPD of more than 5 years' duration was found disadvantage for preserving cardiac function and closely related to advance LVH as compared with hemodialysis (HD)[52]. The patients who can proceed with PD in the long run may have good self-care and well-controlled risk factors of LVH, i.e. body weight, hypertension and diabetes. This is the one explanation of LVH regression in long-term PD patients. Moreover, high serum phosphate of CAPD patients was demonstrated to be associated with LVMI independently, which was similar to the previous trial[53].

The prevalence of PAH in our study was comparable with the previous ones[54] (27.2% vs. 32.4%) and also found that longer duration of CAPD up to 42 months may reduce RVSP about 7.17 mmHg per 1 month. However, the value of RVSP calculated from echocardiography can be changed by the varying of right atrial pressure value which was altered by the volume status of participants. Additionally, this was designed as a cross-sectional trial which could not evaluate this time-varying outcome precisely. Therefore it is necessary to be proven by future prospective trials and evaluate RVSP value with more accurate tool such as right heart catheterization.

This study was limited by the small number of the study population, which related to a low level of adjusted R^2 in multiple regression analysis. In addition, this was investigated and illustrated only to a surrogate outcome. Further long-term, well designed prospective studies will answer this better, in particular the study of clinical associations between cardiovascular morbidity and mortality and echocardiographic variables. Nevertheless, this study pointed out the importance of hemoglobin level for LVH regression of dialysis patients. It will remind the physicians to pay more attention to the anemic problem in this group of patients.

Conclusion

This study revealed a higher prevalence of LVH in Thai CAPD patients, when compared with the previous studies and with anemia still being an important independent factor for developing LVH. A longer period of CAPD may regress LVH and lower RVSP. This should be proven by the longer well-designed prospective studies.

What is already known on this topic ?

Anemia or hemoglobin levels and serum phosphate are the independent factors for LVH in dialysis patients. Pulmonary hypertension is detected in ESRD patients in the rate about 20%. However, the effect of duration of CAPD to LVH and RVSP of dialysis patients is still uncertain in the long-term study.

What this study adds ?

Longer duration of CAPD may regress LVH and lower RVSP level. RV systolic function is in normal range in majority of patients but almost half of the patients have diastolic dysfunction.

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Potential conflicts of interest

None.

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การศึกษาลักษณะสำคัญทางคลินิกและการตรวจหัวใจด้วยคลื่นเสียงสะท้อนความถี่สูงในผู้ป่วยชาวไทยโรคไตวายเรื้อรังที่ได้รับการล้างไตทางช่องท้อง

ธีรานันท์ อังคณานาฏ, สิริภา ช้างศิริกุลชัย, จิรายุทธ จันทร์มา, ธนพัฒน์ วรรณศิริ, ปิยะธิดา แสงทอง

ภูมิหลัง: การศึกษาก่อนหน้านี้พบว่าผู้ป่วยที่ได้รับการล้างไตมีการเปลี่ยนแปลงทางโครงสร้างและการทำงานของหัวใจหลายประการที่ตรวจพบได้โดยการทำคลื่นเสียงสะท้อนความถี่สูง ซึ่งเป็นตัวบ่งชี้ที่สำคัญต่อการพยากรณ์โรคในผู้ป่วยกลุ่มนี้แต่อย่างไรก็ตามข้อมูลจากการทำคลื่นเสียงสะท้อนความถี่สูงดังกล่าวในผู้ป่วยชาวไทยโรคไตวายเรื้อรังที่ได้รับการล้างไตทางช่องท้องมีอยู่จำกัด การศึกษานี้จึงมีเป้าหมายเพื่อศึกษาความสัมพันธ์ระหว่างข้อมูลพื้นฐานทางคลินิก และลักษณะจากการตรวจหัวใจด้วยคลื่นเสียงสะท้อนความถี่สูงในกลุ่มผู้ป่วยชาวไทย โรคไตวายเรื้อรังที่ได้รับการล้างไตทางช่องท้อง

วัสดุและวิธีการ: เป็นการศึกษาแบบ cross-sectional observational study ในผู้ป่วยชาวไทยโรคไตวายเรื้อรังของศูนย์การแพทย์สมเด็จพระเทพรัตนราชสุดาฯ สยามบรมราชกุมารี มหาวิทยาลัยศรีนครินทรวิโรฒ ได้รวบรวมข้อมูลจากผู้ป่วยนอกที่ทำการล้างไตทางช่องท้องจำนวน 104 ราย ในช่วงระยะเวลาวันที่ 1 กันยายน พ.ศ. 2555 ถึง วันที่ 31 มิถุนายน พ.ศ. 2557 โดยเก็บรวบรวมข้อมูลพื้นฐานทางคลินิก ลักษณะที่พบจากการตรวจหัวใจด้วยคลื่นเสียงความถี่สูง และข้อมูลทางห้องปฏิบัติการของผู้ป่วยในช่วงระยะเวลาใกล้เคียงกับการทำการตรวจหัวใจด้วยคลื่นเสียงความถี่สูงมากที่สุด

ผลการศึกษา: ในจำนวนผู้เข้าร่วมวิจัยทั้งหมด 104 รายแบ่งเป็นผู้ชาย 50 รายและผู้หญิง 54 ราย โดยมีอายุเฉลี่ยประมาณ 59.4±12.7 ปี และค่ามัธยฐานของระยะเวลาที่ได้รับการล้างไตทางช่องท้องประมาณ 12 เดือน พบว่ามีเปอร์เซ็นต์ความชุกของการตรวจพบค่า left ventricular mass index (LVMI) ที่สูงกว่าค่าปกติถึง 82.7% โดยพบค่าเฉลี่ยดังกล่าวในผู้ชายสูงกว่าผู้หญิง (166.2±55.6 vs. 131±47.6 กรัม/ตารางเมตร) ผู้เข้าร่วมการวิจัยทุกรายพบมีความผิดปกติของ diastolic function แต่ความผิดปกติในผู้ป่วยส่วนใหญ่อยู่ในระดับน้อย (diastolic dysfunction grade I) นอกจากนี้ปัจจัยเรื่องเพศชาย ความดันโลหิตสูง ระดับค่าฟอสเฟตในเลือดที่สูง ระดับค่าฮีโมโกลบินที่ต่ำ ค่า corrected QT interval และระยะเวลาการล้างไตทางช่องท้องที่นานมากกว่า 24 เดือนเป็นปัจจัยบ่งชี้ถึงการเปลี่ยนแปลงของค่า LVMI ได้ และที่น่าสนใจคือ ระยะเวลาในการทำการล้างไตทางช่องท้องที่นานมากกว่า 42 เดือน อาจช่วยลดค่าความดันซิสโตลิก right ventricular systolic pressure (RVSP) ในผู้ป่วยกลุ่มนี้ลงได้

สรุป: การศึกษานี้พบว่ามีความชุกของภาวะหัวใจห้องล่างซ้ายโตหรือ Left Ventricular Hypertrophy (LVH) ในผู้ป่วยชาวไทยที่ทำการล้างไตทางช่องท้องสูงกว่าในการศึกษาที่ผ่านมาและพบว่าภาวะซีดยังคงเป็นปัจจัยสำคัญในการเกิดภาวะ LVH นอกจากนี้การล้างไตทางช่องท้องได้ในระยะเวลานานอาจช่วยลดภาวะ LVH และค่า RVSP ลงได้ แต่อย่างไรก็ตามจำเป็นต้องทำการพิสูจน์ยืนยันข้อสรุปนี้ด้วยการศึกษาวิจัยในอนาคตด้วยรูปแบบการศึกษาวิจัย prospective study ต่อไป