Data Article

Data on the assessment of LV mechanics by speckle tracking echocardiography in ADPKD patients

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A B S T R A C T

In this article, we report anthropometric, clinical and laboratory data from Autosomal Dominant Polycystic Kidney Disease (ADPKD) patients with mild to moderate renal dysfunction and normal LV ejection fraction and from age- and sex-matched healthy controls and renal controls. Factors influencing LV untwisting rate in the group of ADPKD patients are also reported. For further interpretation and discussion please refer to the research article “Left ventricular dysfunction in ADPKD and effects of Octreotide-LAR: a cross-sectional and longitudinal sub study of the ALADIN trial” (Spinelli et al., 2018) [1].

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**Value of the data**

- This data provides information on association between clinical and echocardiographic parameters of left ventricular diastolic function and potential influence on such parameters of the treatment with somatostatin-analogue octreotide long-acting-release in patients with Autosomal Dominant Polycystic Kidney Disease and normal ejection fraction.
- To assess reproducibility of speckle-tracking measurements, intra-observer and inter-observer variability values are provided.
- These data are valuable as they prove the usefulness of speckle-tracking echocardiography in Autosomal Dominant Polycystic Kidney Disease to detect very early impairment of left ventricular function that is missed with conventional echocardiography and may stimulate further research.

1. **Data**

Anthropometric, clinical hemodynamic, laboratory and therapy data from and healthy controls, renal controls and Autosomal Dominant Polycystic Kidney Disease (ADPKD) patients, categorized according to treatment with octreotide-long acting release (LAR) or placebo, are provided in Tables 1 and 2. Diabetes mellitus was found only in renal controls (6 out 34 patients, 17.6%), while the prevalence of systemic arterial hypertension was comparable between ADPKD and renal controls. Laboratory data were similar in ADPKD patients and their healthy and renal controls, by excluding higher fasting serum glucose levels and urinary protein excretion in renal controls. Likewise, anthropometric, clinical and laboratory characteristics were very much the same between the 16 ADPKD patients randomized to octreotide-LAR therapy and the 18 randomized to placebo.

Data on association of clinical and echocardiographic variables with left ventricular (LV) untwisting rate in the group of ADPKD patients by univariate and multivariate linear regression analyses are provided in Table 3. LV early diastolic untwisting rate was associated with left ventricular mass (LVM) index and diastolic blood pressure (BP) at univariate analysis. These associations did not change at multivariate analysis.

Data on adjusted linear regression analysis showing the relationships, in ADPKD patients, between LV untwisting rate at final visit and the following variables: age, body surface area, glomerular
Details regarding the changes of untwisting rate in ADPKD patients are described and commented in Ref. [1].

2. Experimental design, materials, and methods

2.1. ADPKD patients selection criteria

All ADPKD patients consecutively included in the ALADIN trial [2] at the Outpatient Clinic of the Federico II University of Naples were evaluated for participation. They had to fulfill the selection criteria of the ALADIN trial [2]. For the specific purposes of the present dataset, patients with previous myocardial infarction, atrial fibrillation, cardiac valve disease or obstructive pulmonary disease were also excluded.

Data on ADPKD patients selection, are reported in Fig. 1. ADPKD patients were compared with age- and gender-matched healthy controls or equally-matched renal controls with non-cystic chronic kidney disease. LV function was assessed by speckle tracking echocardiography. For further details see Ref. [1]. Changes in LV function were compared in the 16 and 18 ADPKD patients randomized respectively to octreotide-LAR or placebo for three years [2].

2.2. Echocardiography

Two-dimensional echocardiography was performed by using a digital ultrasonic device system (Vivid 7, GE Vingmed Ultrasound, Horten, Norway) with patients lying in left lateral decubitus. Gray scale 4-chamber, 2-chamber and long-axis LV apical views as well as basal and apical LV short axis views were obtained at a high frame rate (60–80 frames/s). The basal level was marked as one showing the tips of mitral valve leaflets, the apical level was defined just proximal to the level with LV luminal obliteration at end systolic period.

Table 1

|                      | Healthy Controls (n = 34) | Renal Controls (n = 34) | ADPKD patients All patients (n = 34) | Octreotide-LAR (n = 16) | Placebo (n = 18) |
|----------------------|--------------------------|-------------------------|--------------------------------------|-------------------------|------------------|
| Age (years)          | 34.8 ± 6.9               | 38.2 ± 8.6              | 35.8 ± 8.4                           | 33.2 ± 8.4              | 38.1 ± 7.8       |
| Men, n (%)           | 13 (38.2)                | 13 (38.2)               | 13 (38.2)                            | 6 (37.5)                | 7 (38.8)         |
| Height (cm)          | 170 ± 5                  | 169 ± 8                 | 167 ± 9.5                            | 167 ± 10                | 168 ± 9          |
| Weight (kg)          | 71 ± 8                   | 71 ± 10                 | 74 ± 16                              | 73 ± 18                 | 75 ± 13          |
| Body Mass Index      | 25.0 ± 3.6               | 25.2 ± 4                | 25.8 ± 3.8                           | 25.06 ± 3.8             | 26.5 ± 3.9       |
| Diabetes mellitus, n (%) | 0 (0)                       | 6 (17.6)               | 0                                     | 0                       | 0                |
| Hypertension, n (%)  | 0 (0)                     | 24 (70.6)               | 22 (64.7)                            | 10 (62.5)               | 12 (66.6)        |
| Active smoker, n (%) | 11 (32.3)                | 15 (44.1)               | 15 (44.1)                            | 7 (43.7)                | 8 (44.4)         |
| Family history of hypertension, n (%) | 11 (32.3)                     | 14 (41.2)              | 19 (55.9)                            | 8 (50.0)                | 11 (61.1)        |

Values are means ± SD for continuous variables, and absolute numbers (%) for categorical variables.

ADPKD = autosomal dominant polycystic kidney disease; LAR = Long-Acting-Release; CAD = coronary artery disease.

*p < 0.01 versus healthy controls,
*b p < 0.01 versus ADPKD,
|                              | Healthy Controls (n = 34) | Renal Controls (n = 34) | ADPKD Patients (All patients (n = 34)) | Octreotide-LAR (n = 16) | Placebo (n = 18) |
|------------------------------|---------------------------|-------------------------|----------------------------------------|-------------------------|-----------------|
|                              |                           |                         |                                        | Baseline Final visit    | Baseline Final visit |
| Heart rate (b/min)           | 66.7 ± 5.0                | 72.3 ± 8.1              |                                        | 72.0 ± 10.6             | 71.0 ± 6.0      |
| Systolic BP (mmHg)           | 119.2 ± 8.6               | 133.7 ± 21.6            |                                        | 122.2 ± 9.3             | 123.0 ± 13.0    |
| Diastolic BP (mmHg)          | 74.3 ± 7.7                | 81.8 ± 11.0             |                                        | 79.0 ± 8.0              | 81.0 ± 10.0     |
| Mean BP (mmHg)               | 89.3 ± 7.5                | 99.1 ± 13.9             |                                        | 92.8 ± 8.0              | 94.0 ± 7.0      |
| Fasting serum glucose (mg/dl)| 84.0 ± 4.3                | 96.6 ± 8.5              |                                        | 84.2 ± 4.7              | 79.0 ± 7.0      |
| Hemoglobin (g/dl)            | 14.1 ± 1.3                | 13.8 ± 1.4              |                                        | 13.9 ± 1.4              | 13.0 ± 1.1      |
| Hematocrit (%)               | 42.2 ± 3.9                | 41.4 ± 4.3              |                                        | 41.7 ± 3.8              | 38.7 ± 3.8      |
| Serum creatinine (mg/dl)     | 0.82 ± 0.19               | 1.23 ± 0.59             |                                        | 1.03 ± 0.37             | 1.08 ± 0.6      |
| Serum calcium (mg/dl)        | 9.5 ± 0.4                 | 9.5 ± 0.4               |                                        | 9.5 ± 0.4               | 8.7 ± 2.1       |
| Serum phosphorus (mg/dl)     | 3.4 ± 0.6                 | 3.3 ± 0.4               |                                        | 3.3 ± 0.5               | 2.5 ± 1.6       |
| Total cholesterol (mg/dl)    | 167.1 ± 21.1              | 182.6 ± 30.1            |                                        | 180.1 ± 27.9            | 184.3 ± 28.6    |
| HDL cholesterol (mg/dl)      | 57.2 ± 7.3                | 52.4 ± 10.0             |                                        | 51.6 ± 14.6             | 56.6 ± 19.3     |
| Triglycerides (mg/dl)        | 106.5 ± 55.9              | 114.1 ± 57.1            |                                        | 108.2 ± 51.0            | 104.2 ± 50.0    |
| PTH (pg/ml)                  | 30.2 ± 7.6                | 34.1 ± 8.8              |                                        | 47.9 ± 24.0             | 75.5 ± 65.9     |
| GFR (mL/min/1.73 m²)         | 120.8 ± 8.6               | 70.7 ± 28.4             |                                        | 82.1 ± 26.2             | 80.7 ± 28.6     |
| Urine proteins (g/24 h)      | 0.9 (0.72–1.15)           | 0.14 (0.03–0.26)        |                                        | 0.14 (0.03–0.26)        | 0.14 (0.03–0.29) |
| ACE inhibitor                | 0                          | 21 (61.8)               |                                        | 21 (61.8)               | 1 (6.2)         |
| ARB                          | 0                          | 13 (38.2)               |                                        | 12 (35.3)               | 6 (37.5)        |
| Statin                       | 0                          | 21 (61.8)               |                                        | 2 (5.9)                 | 1 (6.2)         |

Values are means ± SD or medians (interquartile range) for continuous variables, and absolute number (%) for categorical variables.

ADPKD = autosomal dominant polycystic kidney disease; LAR = long-acting-release; BP = blood pressure; HDL = high-density lipoprotein; PTH = parathyroid hormone; GFR = glomerular filtration rate; ACE = angiotensin converting enzyme; ARB = angiotensin II receptor blockers.

* p < 0.05 versus healthy controls.
† p < 0.001 versus healthy controls.
‡ p < 0.001 versus renal controls.
§ p < 0.05 versus renal controls.
¶ p < 0.05 final visit vs. baseline.
2.3. Echocardiography analysis

According to the American Society of Echocardiography guidelines [3], LV mass (M) and ejection fraction were calculated by Devereux formula and biplane Simpson’s algorithm, respectively. LVM was divided by body surface area in order to calculate LVM index. The measurement of left atrium volume was obtained using the apical 4-chamber and 2-chamber views and modified Simpson’s rule. LV filling was assessed by mitral flow velocity curves and mitral annulus tissue Doppler imaging. Mitral early (E) and late (A) diastolic peak flow velocities, E deceleration time, isovolumic relaxation time and peak mitral annulus velocity during early diastolic filling (Ea) were measured. Details regarding speckle-tracking echocardiography analysis are described in Ref. [1].

2.4. Reproducibility of speckle-tracking echocardiography measurements

To assess reproducibility of speckle-tracking measurements the echocardiographic studies were repeated by the same observer in 15 randomly selected patients (5 from each group of the cross-sectional study) within one month after completing the initial analysis and before ADPKD randomization in the ALADIN trial. The same studies were also analyzed by an independent observer to determine inter-observer variability. Intra-observer and inter-observer variability values were calculated as the absolute difference between the corresponding two measurements in terms of percentage of their mean. Intra-observer variability was expressed as a percentage of the mean, and inter-observer variability was expressed as a percentage of the mean of the two measurements.

Table 3
Univariate and multivariate linear regression analysis showing associations of clinical and echocardiographic variables with LV untwisting rate in the group of ADPKD patients at inclusion in the ALADIN Trial.

| Variable                        | Univariate analysis | Multivariate analysis* |
|---------------------------------|---------------------|------------------------|
|                                 | \( \beta \) (95% CI) | \( p \) Value          | \( \beta \) (95% CI) | \( p \) Value          |
| Age                             | 0.015 (-0.746 – 0.811) | 0.932                  | -0.337 (-1.441 – -0.093) | 0.027                  |
| Body Surface Area               | 0.005 (-28.310 – 29.079) | 0.978                  | 0.342                  |
| GFR                             | -0.165 (-0.359 – 0.132) | 0.352                  | 0.478 (0.201 – 0.854) | 0.002                  |
| Systolic BP                     | -0.222 (-0.920 – 0.028) | 0.208                  | 0.478 (0.201 – 0.854) | 0.002                  |
| Diastolic BP                    | -0.342 (-1.547 – -0.007) | 0.048                  | -0.337 (-1.441 – -0.093) | 0.027                  |
| LV end-diastolic volume         | 0.168 (-0.170 – 0.477) | 0.342                  | 0.478 (0.201 – 0.854) | 0.002                  |
| LV end-systolic volume          | 0.181 (-0.413 – 1.280) | 0.305                  | 0.478 (0.201 – 0.854) | 0.002                  |
| LVM index                       | 0.481(0.183 – 0.879) | 0.004                  | 0.478 (0.201 – 0.854) | 0.002                  |
| Global longitudinal strain      | 0.231 (-1.164 – 5.677) | 0.188                  | 0.478 (0.201 – 0.854) | 0.002                  |
| LV twist                        | 0.015 (-2.368 – 2.569) | 0.934                  | 0.478 (0.201 – 0.854) | 0.002                  |

LV = left ventricular; ADPKD = autosomal dominant polycystic kidney disease; CI = confidence interval; GFR = glomerular filtration rate; BP = blood pressure; LVM = left ventricular mass.

* Multivariate model includes only diastolic BP and LVM index as covariates (i.e. only those with \( p < 0.1 \) at univariate analysis).

Table 4
Adjusted linear regression analysis showing associations of octreotide-LAR treatment with final LV untwisting rate in the group of ADPKD patients.

| Variable                        | \( \beta \) (95% CI) | \( p \) Value |
|---------------------------------|---------------------|--------------|
| Age                             | -0.044(-1.474 – 1.192) | 0.829        |
| Body Surface Area               | 0.144 (-28.715 – 62.766) | 0.451        |
| GFR                             | 0.281(-0.142 – 0.647) | 0.199        |
| Heart rate                      | -0.122 (-1.308 – 0.744) | 0.577        |
| Systolic BP                     | 0.015 (-1.038 – 1.107) | 0.948        |
| Diastolic BP                    | -0.127 (-1.966 – 1.107) | 0.570        |
| Octreotide-LAR treatment        | -0.504 (-46.905 – -6.367) | 0.012        |

LAR = long-acting-release; LV = left ventricular; ADPKD = autosomal dominant polycystic kidney disease; CI = confidence interval; GFR = glomerular filtration rate; BP = blood pressure.
variability was $r = 0.95$ for global longitudinal strain (SE of estimation: 4.1%), and 0.91 for twist (SE of estimation 4.9%), $r = 0.90$ for LV untwisting rate (SE of estimation: 5.1%). Inter-observer variability was $r = 0.93$ for global longitudinal strain (SE of estimation: 4.9%), $r = 0.90$ for twist (SE of estimation: 6%), $r = 0.89$ for untwisting rate (SE of estimation: 6.2%).

Transparency document. Supporting information

Transparency data associated with this article can be found in the online version at https://doi.org/10.1016/j.dib.2018.11.041.
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