Data in Brief 21 (2018) 1654–1658

Contents lists available at ScienceDirect

Data in Brief

journal homepage: www.elsevier.com/locate/dib

Data Article

Evaluation data about accuracy of cadmium-zinc-telluride imaging in detecting single and multivessel coronary artery disease: Focus on gender differences

Alessia Gimelli [a,1], Nicola Riccardo Pugliese [b,*,1], Annette Kusch [a], Assuero Giorgetti [a], Paolo Marzullo [a,c]

[a] Fondazione Toscana G. Monasterio, Pisa, Italy
[b] Cardio-Thoracic and Vascular Department, University Hospital of Pisa, Pisa, Italy
[c] CNR, Institute of Clinical Physiology, Pisa, Italy

ARTICLE INFO

Article history:
Received 27 September 2018
Received in revised form
23 October 2018
Accepted 27 October 2018
Available online 1 November 2018

ABSTRACT

The data presented in this article are related to the research article entitled: "Accuracy of cadmium-zinc-telluride imaging in detecting single and multivessel coronary artery disease: is there any gender difference?" (Gimelli et al., 2018).

We evaluated gender-related differences in diagnostic accuracy of cadmium-zinc-telluride (CZT) myocardial perfusion imaging (MPI) in detecting single- and multi-vessel coronary artery disease (CAD). We included 1161 consecutive patients with known or suspected coronary artery disease (228, 25% women and 873, 75% men) who had been referred to our laboratory for stress–rest myocardial perfusion imaging (single-day stress–rest low-dose ultrafast protocol). All patients underwent coronary angiography within 30 days; CAD was defined in the presence of a coronary stenosis $>$ 70%. Summed stress scores (SSS), summed rest scores (SRS) and summed difference scores (SDS) were obtained. Image quality was graded "good" or better in more than 90% of patients.

DOI of original article: https://doi.org/10.1016/j.ijcard.2018.09.102
* Correspondence to: Fondazione CNR/Regione Toscana "Gabriele Monasterio", CNR Research Area, via Moruzzi n.1, 56124 Pisa, Italy.
E-mail address: n.r.pugliese88@gmail.com (N.R. Pugliese).
[1] Equally contributed to this study as first co-authors.

https://doi.org/10.1016/j.dib.2018.10.146

Specifications table

Subject area	*Cardiology*
More specific subject area	*Cardiac nuclear medicine*
Type of data	*Table*
How data was acquired	*Cadmium-zinc-telluride-based myocardial single-photon emission computed tomography*
Data format	*Analyzed*
Experimental factors	*We analyzed patients referred to our laboratory with suspected coronary artery disease (CAD). All of the patients included in the study underwent a coronary angiography, considered the gold standard for detection of CAD*
Experimental features	*We propose the multitask approach of CZT-SPECT to improve CAD detection and patient stratification, thanks to an accurate morpho-functional evaluation.*
Data source location	*Pisa (Italy)*
Data accessibility	*Data are with this article.*
Related research article	A. Gimelli, N.R. Pugliese, A. Kusch, A. Giorgetti, P. Marzullo, Accuracy of cadmium-zinc-telluride imaging in detecting single and multivessel coronary artery disease: Is there any gender difference?, Int. J. Cardiol. (2018) [1]

Value of the data

- The data derived from this study can be used to show that evaluation of multivessel disease can be obtained by CZT camera with high accuracy.
- Data from CZT-SPECT have high diagnostic accuracy in men as well as in woman, at a lower radiation exposure.
- As a bonus, CZT-based MPI provides data about morpho-functional analysis to further discriminate patients with different degrees of CAD.

1. Data

On coronary angiography, we observed 13 left main trunk stenosis, 486 left anterior descending artery stenosis, 393 left circumflex artery stenosis and 499 right coronary artery stenosis. Global SSS was the best predictor of CAD in women (AUC =;0.866, 81% sensitivity and 79% specificity) and in men (AUC = 0.871, 76% sensitivity and 84% specificity). Interestingly, its accuracy was maintained also in patients with double (women: AUC = 0.842, $p < 0.001$; men: AUC 0.839, $p < 0.001$) or triple-vessels disease (women: AUC = 0.800, $p < 0.001$; men: AUC 0.804, $p < 0.001$). There was no gender-related difference in terms of diagnostic accuracy (see Table 1).

2. Experimental design, materials, and methods

2.1. Stress protocols

Patients discontinued beta-blockers, calcium antagonists and nitrates 48 h before testing. Bicycle exercise stress test (25 W/min protocol) or dipyridamole (intravenous administration: 0.56 mg/kg over 4 min) was chosen.

Table 1
Diagnostic accuracy in detecting CAD: MPI-derived SSS in women and men according to the stress protocol.

	Women ($n = 288$)					Men ($n = 873$)					p[c] Value
	Patients	Cut-off	AUC (95% CI)*	SEN (95% CI)	SPE (95% CI)	Patients	Cut-off	AUC (95% CI)*	SEN (95% CI)	SPE (95% CI)	
CAD[a]											
Maximal Ex test	107 (37%)	> 6	0.91 (0.81–0.97)	75 (55–89)	95 (75–99)	449 (51%)	> 7	0.91 (0.83–0.96)	78 (68–86)	88 (78–95)	ns
Submaximal Ex test	68 (24%)	> 5	0.83 (0.75–0.89)	89 (80–96)	66 (52–79)	151 (17%)	> 6	0.84 (0.76–0.87)	74 (69–79)	81 (72–87)	ns
Dip stress	113 (39%)	> 6	0.87 (0.80–0.93)	83 (71–92)	87 (74–94)	273 (32%)	> 5	0.89 (0.85–0.92)	89 (84–94)	78 (69–86)	ns
Multi-vessel CAD[b]											
Maximal Ex test	32 (11%)	> 11	0.86 (0.77–0.91)	69 (52–83)	93 (85–97)	155 (18%)	> 11	0.90 (0.87–0.96)	80 (65–90)	87 (79–93)	ns
Submaximal Ex test	28 (10%)	> 7	0.84 (0.73–0.94)	81 (58–95)	76 (58–89)	69 (8%)	> 9	0.81 (0.77–0.85)	78 (71–84)	74 (69–79)	ns
Dip stress	31 (11%)	> 9	0.83 (0.75–0.90)	84 (66–95)	68 (56–78)	99 (11%)	> 8	0.84 (0.78–0.88)	83 (74–90)	71 (64–78)	ns

AUC: area under the curve; CAD: coronary artery disease; Dip: dipyridamole; Ex: exercise stress; MPI: myocardial perfusion imaging; ROC: receiver operating characteristic; SEN: sensitivity %; SPE: specificity %; SSS: summed stress score.

[a] CAD involving at least one vessel.
[b] CAD involving at least two vessels.
[c] Pairwise comparison between the AUCs obtained from ROC analysis in women and men.
* $p < 0.001$ for all the AUCs in comparison with diagona.

2.2. Acquisition protocol

Each patient underwent stress–rest CZT imaging according to a single-day protocol [2].

2.3. Analysis of CZT images

The quality of both stress and rest images was graded visually on a four-point scale as 1 (poor), 2 (fair), 3 (good) or 4 (excellent). The following parameters were considered: myocardial count density and uniformity; endocardial and epicardial edge definition; visualization; and background noise, especially from the subdiaphragmatic area. Stress and rest perfusion images from the CZT camera were semi-quantitatively scored according to the 17-segment model of the left ventricle and a five-point scale (0 normal, 1 equivocal, 2 moderate and 3 severe reduction in radioisotope uptake, and 4 absence of detectable tracer uptake). Then, summed stress score (SSS), summed rest score (SRS) and summed difference score (SDS) were calculated. To match the results with coronary angiograms, the 17 segments were grouped into territories of the three main coronary arteries: left anterior descending artery (LAD), circumflex artery (LCx) and right coronary artery (RCA).

Left ventricular volume, ejection fraction and mass, diastolic function and LV eccentricity index were measured after stress and at baseline as previously validated [3–5].

2.4. Coronary angiography

Selective conventional coronary angiography was performed using standard techniques (Innova 2000 GE; General Electric). Coronary angiograms were quantitatively analysed using an off-line computer-based software program (MEDIS CMS version 6.0; MEDIS Imaging Systems) with an automatic edge-contour detection algorithm. The variables explored were the presence of significant stenosis ($\geq$ 70% luminal diameter reduction) in the epicardial coronary arteries or $\geq$ 50% in the left main trunk. According to the number of the involved coronary arteries, we described one-vessel, two-vessel and three-vessel CAD.

2.5. Diagnostic accuracy of MPI according to the stress protocol

A third of the whole population (386, 33.2%) underwent dipyridamole stress with a higher proportion in women (39% vs 31% in men, $p = 0.01$), while the remaining two thirds (775, 66.8%) performed an exercise stress protocol with a higher prevalence in men (69% vs 61% in women, $p = 0.01$). A submaximal test (achievement of age-predicted heart rate between 80% and 85%) was reported in 219 (18.9%) patients. A significant higher proportion of women (68/288, 24%) were unable to exercise maximally in comparison to men (151/873, 17%; $p = 0.01$), particularly in the presence of multi-vessel CAD (28/91, 31% vs 69/423, 16%; $p = 0.001$). A ROC analysis to detect CAD with global SSS was performed subdividing whole population according to the stress protocol (Table 1). Diagnostic accuracy for one-vessel and multi-vessel CAD was highest with maximal exercise test both in women (AUCs: 0.91, 0.81–0.97 and 0.86, 0.77–0.91) and in men (AUCs: 0.91, 0.83–0.96 and 0.90, 0.87–0.96). The lowest accuracy was reported both in women and men with a submaximal exercise test, regardless of the number of involved vessels: AUCs (one-vessel CAD) 0.83, 0.75–0.89 and 0.84, 0.76–0.87, respectively; AUCs (multi-vessel CAD) 0.84, 0.73–0.94 and 0.81, 0.77–0.85, respectively. In each protocol, pairwise comparison between the AUCs obtained from ROC analysis in women and men demonstrated no significant difference (Table 1). Moreover, there was no difference in diagnostic accuracy between stress protocols in detecting at least one-vessel CAD both in women and in men (p = ns). We observed the same result considering multi-vessel CAD in women (p = ns between stress protocols), while in men with multi-vessel CAD ($n = 69/423$, 16%), a submaximal exercise stress had a significantly lower accuracy ($p < 0.001$) if compared with a maximal exercise stress (p = ns in comparison with dipyridamole stress).

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.2018.10.146.

References

[1] A. Gimelli, N.R. Pugliese, A. Kusch, A. Giorgetti, P. Marzullo, Accuracy of cadmium-zinc-telluride imaging in detecting single and multivessel coronary artery disease: is there any gender difference? Int. J. Cardiol. (2018). https://doi.org/10.1016/j.ijcard.2018.09.102.

[2] A. Gimelli, M. Bottai, D. Genovesi, A. Giorgetti, F. Di Martino, P. Marzullo, High diagnostic accuracy of low-dose gated-SPECT with solid-state ultrafast detectors: preliminary clinical results, Eur. J. Nucl. Med. Mol. Imaging 39 (2012) 83–90. https://doi.org/10.1007/s00259-011-1918-6.

[3] T. Sharir, D.S. Berman, P.B. Waechter, J. Areeda, P.B. Kavanagh, J. Gerlach, X. Kang, G. Germano, Quantitative analysis of regional motion and thickening by gated myocardial perfusion SPECT: normal heterogeneity and criteria for abnormality, J. Nucl. Med. 42 (2001) 1630–1638 ⟨http://www.ncbi.nlm.nih.gov/pubmed/11696631⟩ (Accessed 22 April 2018).

[4] A. Gimelli, R. Liga, M. Bottai, E.M. aria Pasanisi, A. Giorgetti, S. Fucci, P. Marzullo, Diastolic dysfunction assessed by ultra-fast cadmium-zinc-telluride cardiac imaging: impact on the evaluation of ischaemia, Eur. Heart J. Cardiovasc. Imaging 16 (2015) 68–73. https://doi.org/10.1093/ehjci/jeu166.

[5] A. Gimelli, R. Liga, A. Clemente, G. Marras, A. Kusch, P. Marzullo, Left ventricular eccentricity index measured with SPECT myocardial perfusion imaging: an additional parameter of adverse cardiac remodeling, J. Nuclear Cardiol. (2017), https://doi.org/10.1007/s12350-017-0777-3.