

Dynamics of anxiety in women undergoing coronary angiography

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Abstract

Background: Anxiety is a common and serious problem in ischaemic heart disease. Anxiety-associated somatisation disorders may imitate symptoms of coronary artery disease or coexist with ischaemic heart disease. Despite multiple visits to various specialists, patients with somatisation are frequently misdiagnosed and therefore mistreated. Identification of patients with anxiety disorders among patients complaining of chest pain is a prerequisite for appropriate management. By its nature, coronary angiography is a diagnostic test that can give rise to anxiety. However, dynamics of anxiety in this setting may be variable depending on coexisting mental disorders.

Aim: The purpose of this study was to determine whether the presence of significant atherosclerotic lesions in coronary arteries affects anxiety level changes following coronary angiography.

Methods: A group of 90 female patients who underwent coronary angiography was divided into two groups: the first one included 48 patients without significant coronary stenoses, and the other one included 42 patients with confirmed significant atherosclerotic lesions. Dynamics of anxiety level changes from the hospital admission, through the post-examination period, until 6 to 9 months after coronary angiography was evaluated with three-time measurement of anxiety using the Spielberger's State-Trait Anxiety Inventory. In addition, intensity of anxiety as a trait was measured twice (at the first and the third examination).

Results: The highest intensity of anxiety as a state was noted in both groups at the first measurement. A significant reduction in anxiety was observed at the second measurement, more pronounced in the group without significant coronary lesions. At the third measurement, women with confirmed significant coronary lesions showed the lowest level of anxiety, while the level of anxiety increased compared to the second measurement in the group of patients without significant coronary lesions. At the third measurement, women without significant coronary lesions showed a significantly higher level of anxiety compared to the group with significant coronary lesions. Intensity of anxiety as a trait was significantly lower at the final measurement in the group of patients with confirmed significant coronary stenoses.

Conclusions: In women demonstrating no significant atherosclerotic lesions in coronary angiography, anxiety does not resolve permanently but reappears after several months. In this group, it seems justified to consider a diagnosis of an anxiety disorder in the form of a somatoform disorder. Those patients should be offered psychiatric therapy.

Key words: anxiety, coronary artery disease, coronary angiography, somatoform disorders, cardiac syndrome X

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INTRODUCTION

Symptoms of anxiety have often been noted to be directly associated with heart disease, including sudden cardiac death (SCD) [1–6]. Ventricular arrhythmia may be a cause

of SCD in patients with anxiety disorders, as indicated by reduced heart rate variability in those patients [7], and increased sympathetic activation that may lead to arrhythmia and SCD.

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Three large prospective studies, including one in a group of about 34,000 men, and another in more than 2,000 men followed up for 30 years, showed a strong relationship between anxiety disorders and cardiac deaths [2–4]. No association was seen between anxiety disorders manifesting as phobia and an increased risk of non-fatal myocardial infarction [3]. Authors of these studies noted that they did not include women, although anxiety disorders are much more common among women. A large study including more than 72,000 women without coronary artery disease (CAD) at baseline, published 11 years later, showed that higher scores in the Crown-Crisp index that measures phobic anxiety was associated with an increased risk of SCD even when controlled for concomitant diseases [1]. These results confirmed an earlier hypothesis of an association between anxiety and adverse CAD outcomes also in women.

An unresolved issue is the effect of anxiety disorders on the incidence of CAD. Barger et al. [8] who evaluated the risk of CAD in subjects with generalised anxiety and depressive disorders in a population of more than 3,000, found that regardless of concomitant depression, anxiety disorders are associated with an increased risk of incident CAD in the general population.

Somatoform disorders, defined as persistent somatic complaints that cannot be explained by any detectable somatic disease, are a very common problem in the clinical practice of both general practitioners and cardiologists [9]. They were given code F45 in the 10th revision of the International Classification of Diseases (ICD-10) and their management includes use of selective serotonin reuptake inhibitors and psychotherapy. Misdiagnosis leads to established perception of a severe disease and unnecessary diagnostic procedures.

By its nature, coronary angiography may induce anxiety and fear regardless of the presence of anxiety disorders. These are usually related to the risk of dying and complications, and appear less frequently among patients informed about the nature of the examination [10, 11]. Of note, in more than half of patients with ischaemic heart disease uncertainty and fear are more troublesome than the chest pain itself [12], and differentiation between patients with somatoform disorders and CAD patients based on the severity or characteristics of anxiety is often impossible, particularly that these two conditions may coexist.

The purpose of this study was to determine whether the presence of significant atherosclerotic lesions in coronary arteries affects anxiety level changes following coronary angiography also during a long-term follow-up.

METHODS

We studied 90 women admitted to a cardiology unit on an elective basis for invasive investigation of CAD.

Exclusion criteria included previous coronary angiography, presence of additional somatic disorders except for

hypertension and diabetes, psychoactive substance abuse, and previous treatment due to a mental disorder.

Based on coronary angiographic findings, the patients were categorised as Group I with excluded significant coronary lesions (often with a diagnosis of cardiac syndrome X), or Group II with confirmed significant coronary stenoses. A significant stenosis was defined as vessel lumen reduction by at least 60%.

Some patients were referred for coronary angiography based on complaints suggesting unstable CAD (resting pain). All patients with the initial diagnosis of stable CAD underwent an exercise test, and those with a positive result (electrocardiographical and/or clinical) of the stress test were subjected to coronary angiographic evaluation. All patients with stable CAD had class II angina according to the Canadian Cardiovascular Society (CCS) classification.

All patients underwent full psychiatric evaluation. They were also evaluated with the Spielberger's State-Trait Anxiety Inventory (STAI), administered three times: immediately after hospital admission, i.e. before coronary angiography; on the next day after coronary angiography; and at 6 to 9 months after coronary angiography. Although more than 90% of participants declared willingness to participate in the third examination, completed questionnaires were returned by only 68 (75%) patients.

Intensity of anxiety was measured using a Polish version of STAI developed by Sosnowski and Wrześniewski [13]. Anxiety as a state (X-1) was evaluated at all 3 examinations, and anxiety as a trait (X-2) at the first and third examination.

To exclude other differences between groups, multiple sociodemographic and clinical parameters were evaluated, as shown in tables.

Statistical analysis

Significance of differences between mean values of normally distributed continuous variables was tested using analysis of variance for independent or dependent samples. Qualitative variables were compared using the χ^2 test (the exact Fisher test was used for expected sample sizes of less than 5).

Parametric and nonparametric correlations were used to assess the effect of studied variables on the severity of anxiety symptoms. The effect of these parameters of the presence of anxiety was evaluated using multivariate logistic regression, with results expressed as odds ratios and 95% confidence interval. Two-sided $p < 0.05$ was considered statistically significant. All statistical analyses were performed using the Statistica PL software, version 6.1 (StatSoft Inc.).

RESULTS

Characteristics of patient groups are shown in Tables 1 and 2. The two groups did not differ significantly except for previous myocardial infarction ($p = 0.0001$). Duration of the waiting period before coronary angiography was specified by only

Table 1. Baseline characteristics of the study groups

	Group I (n = 48; 53.3%)	Group II (n = 42; 46.7%)	P
Age [years]	54.9 ± 6.97	55.6 ± 6.56	0.63
Hypertension	36 (75.0%)	28 (66.7%)	0.38
Marital status (married/unmarried)	13 (27%)/35 (73%)	8 (19%)/34 (81%)	0.37
Education (< 12/≥ 12 years)	26 (54%)/22 (46%)	23 (55%)/19 (45%)	0.77
Waiting period before coronary angiography (< 6/6–12/> 6 months)	16 (42%) 14 (37%)	22 (60%) 9 (24%)	0.72 0.66
Group I: n = 38; Group II: n = 37	8 (21%)	6 (16%)	0.90
Hyperlipidaemia	25 (52.1%)	28 (66.7%)	0.16
Number of clinic visits due to chest pain during the last year	9.7 ± 5.28	10.4 ± 5.80	0.59
Symptoms before coronary angiography	34 (72.3%)	34 (80.9%)	0.34
Procedure explained by the referring physician and patient sense of understanding this information	24 (51.1%)	18 (42.3%)	0.44
Previous myocardial infarction	2 (4.2%)	15 (35.7%)	0.0001
Presence of menses	14 (29.2%)	9 (21.4%)	0.40
Current use of hormonal replacement therapy	8 (16.7%)	5 (11.9%)	0.52
Current stress	35 (72.9%)	24 (57.1%)	0.12
Support by other persons	38 (79.2%)	31 (73.8%)	0.55

Table 2. Characteristics of the study groups at 6–9 months after coronary angiography (n = 68)

	Group I (n = 33; 48.5%)	Group II (n = 35; 51.5%)	P
Hospitalisation due to a cardiac cause during 6–9 months after coronary angiography	2 (6.1%)	6 (17.1%)	0.16
Current stress (at 6–9 months after coronary angiography)	23 (69.7%)	19 (54.3%)	0.19
Psychiatric consultation during 6–9 months after coronary angiography	2 (6.1%)	2 (5.7%)	1.0

Table 3. Intensity of anxiety as a state as measured by State-Trait Anxiety Inventory X-1 in the two study groups in 3 measurements

	Baseline	Before discharge	At 6–9 months	P		
Measurement	1	2	3	1 vs. 2	2 vs. 3	1 vs. 3
Group I	47.5 ± 10.3	40.4 ± 10.3	43.5 ± 9.8	0.0003	0.080	0.019
Group II	45.8 ± 9.0	40.6 ± 9.5	37.8 ± 8.5	0.0039	0.12	< 0.0001
P	0.83	0.45	0.014			

Analysis included only those patients who completed the questionnaire 3 times.

75 (83%) of the evaluated women, so we analysed only those who provided an appropriate answer to this question.

Among patients with significant coronary lesions, coronary angioplasty was performed in 32 women, coronary artery bypass grafting in 8 women, and 2 women were deemed unsuitable for revascularisation.

Evaluation using the State-Trait Anxiety Inventory. No significant difference in the intensity of anxiety as a state was noted in the first 2 measurements. In the third examination, a significantly higher level of anxiety as a state was seen in

patients with excluded significant coronary lesions compared to those with significant atherosclerotic lesions confirmed by coronary angiography ($p = 0.014$). In both groups, a significant reduction in anxiety as a state was seen at the second measurement compared to baseline, and at 6–9 months (third measurement) compared to baseline, with higher statistical significance in Group II ($p < 0.0001$) (Table 3).

When anxiety as a trait was examined, no significant difference between groups was seen at the first measurement, while the intensity of anxiety as a trait was significantly lower

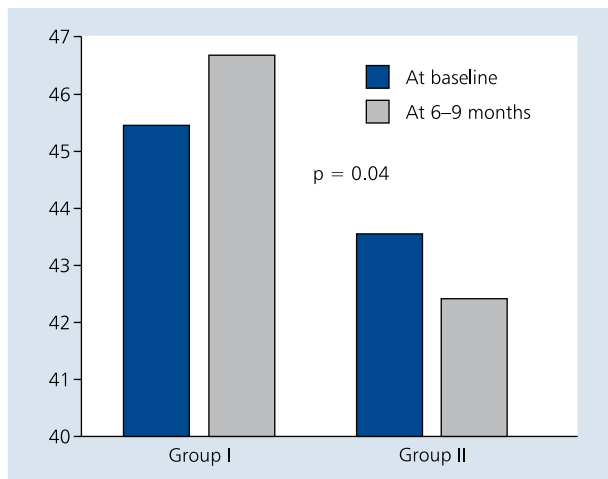


Figure 1. Mean intensity of anxiety as a trait (X-2) in 2 measurements in the analysed groups

at the final measurement in patients without significant coronary lesions compared to patients with significant coronary atherosclerotic lesions ($p = 0.040$) (Fig. 1).

DISCUSSION

In our study, coronary angiography showed no significant atherosclerotic lesions in more than 50% of women. A similar proportion was also reported by other authors [14]. Heikkila et al. [15] showed that more than 80% of patients perceive fear of coronary angiography, and an elevated level of anxiety persists also after this examination in one third of subjects. These authors also reported that anxiety associated with coronary angiography is more frequent, more severe and persists longer in women than in men. In addition, although anxiety was more frequent after coronary angiography, its intensity was higher before the examination [16, 17].

In our study group, all patients reported a lower level of anxiety shortly after the examination but at 6–9 months after coronary angiography, the intensity of anxiety both as state (X-1) and as trait (X-2) was significantly higher in women without significant coronary atherosclerotic lesions. These patients continued to be treated with beta-blockers and calcium antagonists, and half of them received acetylsalicylic acid. This might have given them some sense of safety but on the other hand, it might have also induced some cognitive dissonance due to discrepancy between no objective confirmation of CAD and continuation of its treatment. Among patients in Group II, anxiety decreased by the third measurement, resulting in a significant difference in the intensity of anxiety noted between the groups. In Group II, the intensity of anxiety decreased and quality of life improved, effects not seen in patients without significant coronary stenoses. As the dynamics of anxiety was shown to be clearly different in the 2 groups, it cannot be excluded that the as-

sociation between anxiety and somatic complaints varied between these groups. Perhaps anxiety was secondary to pain in Group II (with significant coronary stenoses) but the inverse was true in Group I. However, our findings cannot prove this hypothesis.

The intensity of anxiety as trait (X-2) did not differ significantly between the study groups. Patients in Group I demonstrated slightly higher scores in the X-2 subscale compared to patients in Group II. In the second measurement at 6–9 months, this difference increased and reached statistical significance. Similar results were reported by Asbury et al. [18], who compared women with cardiac syndrome X, patients with established CAD, and healthy controls. These authors showed, among others, that patients with cardiac syndrome X demonstrated a higher level of anxiety compared to patients with CAD and controls. An increased level of anxiety in patients with cardiac syndrome X is not related to chest pain complaints. These patients are more concerned about their health compared to other subjects. Some authors suggested a psychiatric consultation be indicated in all patients with cardiac syndrome X [19]. The severity of depression following coronary angioplasty was studied by Dudek et al. [20]. These authors evaluated the presence and severity of depression on the day before coronary angioplasty and at 1, 6, and 12 months after this procedure, showing persistent or incident depression in some patients. Other studies showed that in patients undergoing coronary artery bypass grafting, the severity of depression correlated with anxiety as state or trait both before and after cardiac surgery [21].

In our study, a psychiatric consultation was ordered in all patients in both groups. Although the observed anxiety disorders were not uniform, their clinical picture was mostly consistent with the diagnostic criteria of a somatoform disorder according to the ICD-10 [22]. Thus, the most important message from our study is that the presence or coexistence of anxiety disorders should be considered in those women who show persistent or recurrent anxiety after a negative result of coronary angiography.

CONCLUSIONS

1. In women demonstrating no significant atherosclerotic lesions in coronary angiography, anxiety does not resolve permanently but reappears after several months.
2. In this group, it seems justified to consider a diagnosis of an anxiety disorder in the form of a somatoform disorder. Those patients should be offered psychiatric therapy.

Conflict of interest: none declared

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Dynamika lęku u kobiet poddanych koronarografii

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Streszczenie

Wstęp: Lęk jest częstym i poważnym problemem w chorobie niedokrwiennej serca. Może pogarszać jej przebieg, modyfikować objawy i przedłużać dolegliwości subiektywne. Przebiegające z lękiem zaburzenia somatyzacyjne mogą imitować objawy choroby wieńcowej lub współistnieć z chorobą niedokrwinną serca. Mimo wielokrotnych wizyt u lekarzy różnych specjalności u chorych z zaburzeniami somatyzacyjnymi często nie stawia się prawidłowej diagnozy. Wyodrębnienie osób cierpiących na zaburzenia lękowe spośród pacjentów skarżących się na bóle w klatce piersiowej jest warunkiem koniecznym udzielenia im niezbędnej pomocy. Koronarografia jest badaniem, które ze swej natury może powodować lęk, jednak dynamika lęku może być różna w zależności od współistniejących zaburzeń psychicznych.

Cel: Celem pracy było ustalenie, czy obecność istotnych zmian miażdżycowych w tętnicach wieńcowych różnicuje zmiany natężenia lęku po przeprowadzonej koronarografii.

Metody: Grupę 90 kobiet poddanych koronarografii podzielono na dwie podgrupy: 48 pacjentek bez istotnych zwężeń w naczyniach wieńcowych i 42 kobiety z potwierdzonymi, istotnymi zmianami miażdżycowymi. Za pomocą 3-krotnego pomiaru lęku jako stanu — Inwentarzem Stanu i Cechy Lęku Spielberga — oceniono dynamikę zmian natężenia lęku od momentu przyjęcia do szpitala, poprzez okres pozabiegowy, aż do okresu między 6. a 9. miesiącem po koronarografii. Przy 1. i 3. badaniu zmierzono też natężenie lęku jako cechy. W każdej podgrupie porównano wyniki między kolejnymi pomiarami, a następnie w poszczególnych pomiarach porównano wyniki pomiędzy grupami.

Wyniki: Natężenie lęku jako stanu było w obu podgrupach najwyższe przy 1. pomiarze. Przy 2. pomiarze zanotowano istotny spadek, wyraźniejszy w podgrupie bez istotnych zmian w naczyniach wieńcowych. Przy 3. pomiarze kobiety z istotnymi zmianami w tętnicach wieńcowych charakteryzowały się najniższym poziomem lęku, natomiast w podgrupie kobiet bez istotnych zwężeń w tętnicach wieńcowych poziom lęku wzrósł w stosunku do 2. pomiaru. Nie wykazano statystycznie istotnych różnic między grupami w nasileniu lęku przed koronarografią i bezpośrednio po badaniu, zarówno w ocenie lęku jako stanu, jak i lęku jako cechy. Przy 3. pomiarze kobiety z wykluczonymi lub nieistotnymi zmianami miażdżycowymi charakteryzowały się znamienne wyższym poziomem lęku w porównaniu z grupą z istotnymi zwężeniami tętnic wieńcowych. Przy końcowym pomiarze natężenie lęku jako cechy było istotnie niższe w grupie kobiet ze stwierdzonymi istotnymi zwężeniami w tętnicach wieńcowych.

Wnioski: U kobiet bez istotnych zmian miażdżycowych w tętnicach wieńcowych w koronarografii lęk nie ustępuje trwale, lecz ujawnia się ponownie po kilku miesiącach. W tej grupie osób celowe jest rozważenie rozpoznania zaburzeń lękowych pod postacią somatyczną (*somatoform disorders*) i zaproponowanie im leczenia psychiatrycznego.

Słowa kluczowe: lęk, choroba wieńcowa, koronarografia, zaburzenia pod postacią somatyczną, kardiologiczny zespół X

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