Anxiety and Depression in Patients with Chronic Lower Limb Ischaemia

Abstract
The aim of the foregoing paper was to evaluate the level of anxiety and depression in patients with chronic lower limb ischaemia.

The research material was patients of the Clinic of Cardiac and Vascular Surgery at the University Clinical Centre in Gdańsk that were qualified for surgical treatment and Percutaneous Transluminal Angioplasty.

A diagnostic poll method was used for the purpose of this paper. Socio-demographic and clinical data was collected with the use of an original survey questionnaire. Evaluation of the presence of negative emotions such as anxiety and depression was conducted with the Hospital Anxiety and Depression Scale (HADS). First examination was performed in the first day of hospitalization, the next in the third and sixth month from the date of the first examination.

The average value of anxiety level in particular measurements reached similar levels and placed the examined groups at the borderline. The average value of depression placed the group of patients treated surgically on the verge of depression. In terms of depression, patients qualified for surgical treatment were given higher points.

Conclusions:
1. Patients undergoing Percutaneous Transluminal Angioplasty showed borderline symptoms of anxiety, whereas patients treated surgically showed borderline symptoms of anxiety and depression during a six-month observation.
2. Patients qualified for surgical treatment showed higher level of depression.

Keywords: Anxiety; Depression; Lower limb ischaemia; Atherosclerosis

Introduction
Atherosclerosis is the most common cause of peripheral arterial disease (PAD). Atherosclerotic lower limb ischaemia caused by narrowing or closing of arteries supplying blood to legs does not allow enough oxygen to supply the limb muscle mass, as well as other soft tissue and bone structure. Symptoms depend on the place of vascular occlusion, length of the closed section, number of closures/narrowings and the degree of collateral circulation development [1]. The most characteristic symptom is intermittent claudication and along with the development of the disease, chronic ischaemic rest pain, ulceration or gangrene [1,2] may occur. During that time there is a direct threat of amputation due to the development of irreversible ischaemic lesions [3]. Two basic classifications used to evaluate the level of limb ischaemia, i.e. the Fontaine and Rutherford classification, allow observing the disease progression and evaluating treatment results [2]. PAD is connected with troublesome somatic symptoms and undoubtedly has a negative influence on the patients’ quality of life by influencing their physical and psychosocial functioning [4,5]. Therapy in case of the foregoing is an interdisciplinary process that includes medical, educational and psychological activities. Surgical treatment focuses on vascular bypass, PTA - Percutaneous Transluminal Angioplasty and hybrid procedures...
joining the two methods. When revascularization is impossible limb amputation is necessary in order to save the patient’s life [6-8]. Despite access to medical care and effective methods of treatment, the number of people, PTA does not decrease [1] and the occurrence of negative emotions such as anxiety and depression may be a reaction to chronic disorders, troublesome treatment and disability [4,5]. Researchers emphasize that PAD is often accompanied by low moods and indicate that there is a relationship between depression symptoms and its negative influence on the patients’ quality of life [9-13]. Furthermore, they emphasize that lowering the mood has a negative influence on the future prognosis [10,13]. Despite all this, little is known about the frequency of mood disorders and their role in patients with PAD [13].

**Aim of the Paper**

The aim of the foregoing paper was to evaluate anxiety and depression in patients with peripheral arterial disease treated surgically.

**Research Material**

The research materials were patients of the Clinic of Cardiac and Vascular Surgery at the University Clinical Centre in Gdańsk diagnosed with PAD in the femoral-popliteal section. A triple, complete measurement was conducted on 59 patients that underwent vascular bypass procedure and on 60 patients that underwent PTA. Participation in the research was voluntary and anonymous.

Patients were qualified for research based on the foregoing factors: diagnosis and qualification for invasive treatment, written consent to participate in the research, possibility of logical verbal contact.

Patients were not qualified for research based on the foregoing factors: lack of patient’s consent to participate in the research, no logical verbal contact.

In the group of 59 patients treated surgically, 42 people were men (71,2%), 17 women (28,8%). In the group of 60 patients undergoing PTA, 38 were men (63,3%) and 22 were women (36,7 %). The average age of patients treated surgically was 63,8 ± 8,8 years (between 47-81 years, median of 63 years). The average age of patients undergoing PTA was 63,7 ± 7,5 years (between 46-76 years, median of 63 years). In both groups there was a majority of people with primary and vocational education (74,6%; 55,0% respectively) living off their disability and retirement pensions (81,3%; 86,7% respectively). Furthermore, in both groups the majority of patients were married (74,7%).

**Methods**

The foregoing paper uses the diagnostic poll method. The socio-demographic and clinical data were collected based on the original survey questionnaire. The occurrence of negative emotions such as anxiety and depression on the first day of hospitalization, as well as in the third and sixth month from the date of the first examination was evaluated with the Polish version of the Hospital Anxiety and Depression Scale (HADS).

The foregoing research uses the version containing 14 question (not including the aggression and irritation subscale) [14,15]. In order to determine the dissemination of such symptoms in the foregoing groups of patients based on the suggestions of the authors of HADS the following thresholds were applied: 0 – 7 points – lack of any disorders; 8-10 points – borderline symptoms; >10 points – occurrence of symptoms [14,15].

Results were calculated regardless of the anxiety (7 questions) and depression (7 questions) subscale. The results were later categorized, i.e. they were divided into 3 categories (lack of any disorders, borderline, pathology) and their average values were compared on the HADS scale [15].

All statistical calculations were conducted with the use of StatSoft. Inc. (2011). STATISTICA (data analysis software system), version 10.0. and Excel spreadsheet. In all calculations the statistical significance was p< 0,05.

The research project was approved by the Independent Bioethics Commission for Research at the Medical University of Gdańsk (NKEBN/100/2009).

**Results**

The analysed groups did not differ in terms of age, sex, education, marital status and source of income (respectively: p = 0,9486; p = 0,3615; p = 0,0680; p = 0,3368; p = 0,6423).

Characteristics of the research group, including the degree of limb ischaemia based on the Fontaine classification is presented in Table 1.

In the group of patients qualified for surgical treatment, 25 people (42,4%) were diagnosed with 3rd degree lower limb ischaemia and 34 (57,6%) with the 4th degree based on the Fontaine classification. In the group of patients undergoing PTA, 27 people (45,0%) were diagnosed with 2nd degree ischaemia, 22 (36,7%) with 3rd degree ischaemia and 11 (11,8%) with 4th degree ischaemia. In the group of patients undergoing PTA intermittent claudication was observed in 27 people (45,0%). Rest pain was observed in all patients undergoing surgical treatment – 59 people (100,0%) and in 33 patients (55,0%) undergoing PTA. Feet and leg ulcers were present in 28 patients (47,8%) undergoing surgical treatment and in 13 patients (21,7%) undergoing PTA. Necrosis was found in 7 patients (11,9%) undergoing surgical treatment and in 2 patients (3,3%) undergoing PTA. There were significant statistical differences between the examined groups to the extent of the degree of ischaemia, intermittent claudication, rest pain and ulcers.

Anxiety

In the next three measurements conducted on a group of patients undergoing surgical treatment 30% showed high anxiety values, whereas there were only 20 % of patients in the PTA group. Statistical analysis showed no significant differences between the groups, as well as any time differences (Table 2).

Table 3 presents average anxiety values on the HADS scale for the group of patients treated surgically and undergoing PTA. Statistical analysis did not show any differences between
particular measurements and groups (Table 3). The foregoing results indicate that the level of anxiety did not decrease with time and the average value in the first measurement stayed at the same level during subsequent measurements and placed the examined groups on the borderline.

Depression

In the group of people undergoing surgical treatment the average value of depression in the first measurement and during further measurement. The first measurement taken in the group of patients treated surgically obtained significantly higher results (p=0.0070) (Table 5).

Table 5 presents average depression values on the HADS scale for the group of patients treated surgically and undergoing PTA. Differences between particular measurements were not statistically significant (Table 5). However, statistically significant differences between the groups were observed in the first measurement. The first measurement taken in the group of patients treated surgically obtained significantly higher results (p=0.0070) (Table 5).

In the group of people undergoing surgical treatment the average value of depression in the first measurement and during further observation indicates the presence of borderline symptoms.

Discussion

A chronic disease has a negative influence on the patient’s mental condition. Results of examinations on patients with chronic diseases confirm that there are negative differences in the level of anxiety and depression. The most common is the mental discomfort, i.e. depressive or anxiety reactions [16-18]. Meta-analysis conducted by Baira et al. [16] showed the presence of depression in patients treated at various clinics: pain management, orthopaedic, rheumatology or stomatology. Depression was diagnosed in about 50 % of patients suffering from chronic pain [17].

Literature shows little interest in conducting research on the level of anxiety and depression in patients with PAD using the HADS scale. Authors of the foregoing paper found results of examinations conducted by other researchers with the use of the following research tools: Center for Epidemiological Studies Depression Scale (CES- D), Geriatric Depression Scale Short Form (GDS- S), Patient Health Questionnaire (PHQ-9), Zung Self Rating Depression Scale (ZSDS) [9-13,19,20].

Smolderen et al. [13] conducted a research aimed at evaluating the frequency of mood disorders in patients with PAD with the CES- D scale. It was later repeated after the period of 6, 12 and 18 months. Lowering the mood was observed in 16 % of examined patients both during the first and the next measurements. Furthermore, Smolderen et al. [10] analysed the frequency of mood disorders depending on age and sex. Results showed that in patients who have just been diagnosed with PAD treated at two Dutch clinics the frequency of mood disorders turned out to be significantly higher among women <65 years old than among other patients. Other authors also confirm that PAD diagnosed in women is connected with higher risk of depression [21]. On the other hand, research conducted by Ruö et al. [12] with the use of the GDS- S scale for the period of 2 years on the group of 417 patients diagnosed with PAD confirmed that both chronic and newly-diagnosed mood disorders are connected with decreasing the patient’s functionality. Mechanisms governing the foregoing dependence are still being examined [12].

Results of research conducted by authors of the foregoing paper proved that when comparing the levels of anxiety and depression, borderline symptoms of both disorders were more frequent in patients treated surgically than in those undergoing PTA. It has also been found that during the period of waiting for surgical treatment patients showed higher level of depression. This may be explained as the difference in the clinical analysis of examined patients. The group of patients treated surgically is people with more advanced disease as compared to patients undergoing PTA. In this group there was a significantly frequent occurrence of rest pain in lower limbs and foot ulcers. Such advancement of a disease limits the possibility of moving, rest, recreation, leads to resigning from work and limits social contacts. The foregoing is

Table 1 Clinical symptoms based on the Fontaine classification in the examined groups.

<table>
<thead>
<tr>
<th>Degree of ischaemia</th>
<th>Surgical treatment (n=59)</th>
<th>PAD (n=60)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>0 (0.0 %)</td>
<td>27 (45.0 %)</td>
<td>Chi²=38.94</td>
</tr>
<tr>
<td>III</td>
<td>25 (42.4 %)</td>
<td>22 (36.7 %)</td>
<td>p=0.0001</td>
</tr>
<tr>
<td>IV</td>
<td>34 (57.6 %)</td>
<td>11 (18.3 %)</td>
<td></td>
</tr>
<tr>
<td>Claudication</td>
<td>0 (0.0 %)</td>
<td>27 (45.0 %)</td>
<td>Chi²=34.34</td>
</tr>
<tr>
<td>Rest pain</td>
<td>59 (100.0 %)</td>
<td>33 (55.0 %)</td>
<td>Chi²=34.34</td>
</tr>
<tr>
<td>Ulcers</td>
<td>28 (47.5 %)</td>
<td>13 (21.7 %)</td>
<td>Chi²=8.76</td>
</tr>
<tr>
<td>Necrosis</td>
<td>7 (11.9 %)</td>
<td>2 (3.3 %)</td>
<td>Chi²=3.10</td>
</tr>
</tbody>
</table>

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### Table 2 Distribution of results on the occurrence of anxiety in patients undergoing surgical treatment and patients undergoing PTA.

<table>
<thead>
<tr>
<th></th>
<th>Surgical treatment (n=59)</th>
<th>PTA (n=60)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>before treatment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-7 pts.</td>
<td>25 (42.4 %)</td>
<td>33 (55.0 %)</td>
<td>Z=1.45. p=0.1483</td>
</tr>
<tr>
<td>8-10 pts.</td>
<td>14 (23.7 %)</td>
<td>14 (23.3 %)</td>
<td></td>
</tr>
<tr>
<td>&gt;10 pts.</td>
<td>20 (33.9 %)</td>
<td>13 (21.7 %)</td>
<td></td>
</tr>
<tr>
<td><strong>after 3 months</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-7 pts.</td>
<td>26 (44.1 %)</td>
<td>29 (48.3 %)</td>
<td>Z=0.73. p=0.4649</td>
</tr>
<tr>
<td>8-10 pts.</td>
<td>13 (22.0 %)</td>
<td>16 (26.7 %)</td>
<td></td>
</tr>
<tr>
<td>&gt;10 pts.</td>
<td>20 (33.9 %)</td>
<td>15 (25.0 %)</td>
<td></td>
</tr>
<tr>
<td><strong>after 6 months</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-7 pts.</td>
<td>23 (39.0 %)</td>
<td>32 (53.3 %)</td>
<td>Z=1.25. p=0.2107</td>
</tr>
<tr>
<td>8-10 pts.</td>
<td>18 (30.5 %)</td>
<td>13 (21.7 %)</td>
<td></td>
</tr>
<tr>
<td>&gt;10 pts.</td>
<td>18 (30.5 %)</td>
<td>15 (25.0 %)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Distribution of results on the occurrence of anxiety in patients undergoing surgical treatment and patients undergoing PTA.

### Table 3 Average anxiety values for the group of patients undergoing surgical treatment and patients undergoing PTA.

<table>
<thead>
<tr>
<th></th>
<th>Surgical treatment (n=59)</th>
<th>PTA (n=60)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>before treatment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>avg. ± stand. dev.</td>
<td>8.7 ± 3.7</td>
<td>7.8 ± 3.8</td>
<td>Z=1.45. p=0.1468</td>
</tr>
<tr>
<td>scope</td>
<td>0.0-16.0</td>
<td>0.0-17.0</td>
<td></td>
</tr>
<tr>
<td>median</td>
<td>8.0</td>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td>95 % CI</td>
<td>[7.7;9.7]</td>
<td>[6.8;8.8]</td>
<td></td>
</tr>
<tr>
<td><strong>after 3 months</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>avg. ± stand. dev.</td>
<td>8.9 ± 4.6</td>
<td>8.0 ± 4.3</td>
<td>Z=1.05. p=0.2951</td>
</tr>
<tr>
<td>scope</td>
<td>1.0-20.0</td>
<td>0.0-18.0</td>
<td></td>
</tr>
<tr>
<td>median</td>
<td>8.0</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td>95 % CI</td>
<td>[7.7;10.1]</td>
<td>[6.9;9.0]</td>
<td></td>
</tr>
<tr>
<td><strong>after 6 months</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>avg. ± stand. dev.</td>
<td>8.8 ± 4.4</td>
<td>7.6 ± 4.4</td>
<td>Z=1.54. p=0.1213</td>
</tr>
<tr>
<td>scope</td>
<td>0.0-19.0</td>
<td>0.0-18.0</td>
<td></td>
</tr>
<tr>
<td>median</td>
<td>8.0</td>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td>95 % CI</td>
<td>[7.6;9.9]</td>
<td>[6.5;8.7]</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Average anxiety values for the group of patients undergoing surgical treatment and patients undergoing PTA.

### Table 4 Distribution of results on the occurrence of depression in patients undergoing surgical treatment and patients undergoing PTA.

<table>
<thead>
<tr>
<th></th>
<th>Surgical treatment (n=59)</th>
<th>PTA (n=60)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>before treatment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-7 pts.</td>
<td>29 (49.2 %)</td>
<td>40 (66.7 %)</td>
<td>Z=1.72. p=0.0846</td>
</tr>
<tr>
<td>8-10 pts.</td>
<td>18 (30.5 %)</td>
<td>13 (21.7 %)</td>
<td></td>
</tr>
<tr>
<td>&gt;10 pts.</td>
<td>12 (20.3 %)</td>
<td>7 (11.7 %)</td>
<td></td>
</tr>
<tr>
<td><strong>after 3 months</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-7 pts.</td>
<td>25 (42.4 %)</td>
<td>31 (51.7 %)</td>
<td>Z=1.60. p=0.1096</td>
</tr>
<tr>
<td>8-10 pts.</td>
<td>14 (23.7 %)</td>
<td>20 (33.3 %)</td>
<td></td>
</tr>
<tr>
<td>&gt;10 pts.</td>
<td>20 (33.9 %)</td>
<td>9 (15.0 %)</td>
<td></td>
</tr>
<tr>
<td><strong>after 6 months</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-7 pts.</td>
<td>27 (45.8 %)</td>
<td>30 (50.0 %)</td>
<td>Z=0.82. p=0.4116</td>
</tr>
<tr>
<td>8-10 pts.</td>
<td>16 (27.1 %)</td>
<td>20 (33.3 %)</td>
<td></td>
</tr>
<tr>
<td>&gt;10 pts.</td>
<td>16 (27.1 %)</td>
<td>10 (16.7 %)</td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Distribution of results on the occurrence of depression in patients undergoing surgical treatment and patients undergoing PTA.
confirmed by results of a big cohort study conducted in Southern China with the help of a standardized tool: the Chinese version of the GDS-5 scale. A more advanced atherosclerosis of lower limbs occurred together with more advanced symptoms of lowering the mood [11].

Research of Remes et al. [9] concerning the quality of life of patients with PAD after intravascular or surgical revascularization focused on the occurrence of depression among other things. It confirmed that patients after intravascular or surgical revascularization suffered from mood disorders as compared to the control group compatible to the extent of age and sex. Research of Cherr et al. [20] also confirms that depression is common in patients after surgical revascularization and has negative influence on treatment results. In their publication, the authors showed that symptoms of depression were present in about 30% of patients undergoing surgery. The work of Smolderen et al. [22] indicated the presence of depression in patients with PAD that were subject to PTA. Summary of the research confirmed that depression was observed in 20% of examined patients, which decreased to 17% after 1 year from the surgery. In their own research, the authors obtained similar results in patients undergoing percutaneous PTA. During the 6-month observation depression symptoms were present in over 15% of patients.

The results Ciccone et al. angioplasty (PTA) revascularization in patients with diabetes mellitus complication is diabetic foot are effective and to improve mortality and morbidity with diabetic foot [23]. Therefore, the influence to the improvement in the mental state.

Authors of numerous research emphasize that clinical practice over patients with PAD requires conducting screening tests to the extent of mood disorders, their monitoring and therapy [10,12,13]. Research showed that in patients with PAD the self-help cognitive-behavioural program might be useful in the mood disorder therapy [19].

Therefore, authors of the foregoing paper would also like to emphasize that when taking care of a patient we should try and evaluate the level of their anxiety and depression since this will allow to identify patients with mood disorders and to plan medical, preventive and educational treatment.

**Conclusions**

1. Patients undergoing PTA showed borderline symptoms of anxiety and patients undergoing surgical treatment showed borderline symptoms of anxiety and depression during a 6-month observation period.
2. Patients qualified for surgical treatment showed higher levels of depression.

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**Table 5** Average depression values for the group of patients undergoing surgical treatment and patients undergoing PTA.

<table>
<thead>
<tr>
<th></th>
<th>Surgical treatment (n=59)</th>
<th>PTA (n=60)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>before treatment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>avg. ± stand.dev.</td>
<td>7.8 ± 3.9</td>
<td>6.0 ± 4.0</td>
<td>Z=2.69. p=0.0070</td>
</tr>
<tr>
<td>scope</td>
<td>0.0-17.0</td>
<td>0.0-20.0</td>
<td></td>
</tr>
<tr>
<td>median</td>
<td>8.0</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>95 % CI</td>
<td>[6.8;8.8]</td>
<td>[4.9;7.0]</td>
<td></td>
</tr>
<tr>
<td>after 3 month</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>avg. ± stand.dev.</td>
<td>8.0 ± 4.5</td>
<td>6.8 ± 4.2</td>
<td>Z=1.84. p=0.0651</td>
</tr>
<tr>
<td>scope</td>
<td>0.0-17.0</td>
<td>0.0-21.0</td>
<td></td>
</tr>
<tr>
<td>median</td>
<td>9.0</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>95 % CI</td>
<td>[6.9;9.2]</td>
<td>[5.7;7.8]</td>
<td></td>
</tr>
<tr>
<td>after 6 months</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>avg. ± stand. dev.</td>
<td>7.9 ± 3.9</td>
<td>6.8 ± 4.4</td>
<td>Z=1.48. p=0.1381</td>
</tr>
<tr>
<td>scope</td>
<td>0.0-17.0</td>
<td>0.0-21.0</td>
<td></td>
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<tr>
<td>median</td>
<td>8.0</td>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td>95 % CI</td>
<td>[6.8;8.9]</td>
<td>[5.6;7.9]</td>
<td></td>
</tr>
</tbody>
</table>

0.50. p=0.7788 3.45. p=0.1779
References


