Quality of life assessment after lower limb vascular surgeries

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Abstract

Vascular diseases in the lower limbs and their consequences significantly affect a patient`s quality of life. Quality of life is currently considered one of the most important aspects of treatment and rehabilitation.

Aim: The aim of this study was to assess the effect of long term post-operative physiotherapy on well-being and functioning of patients after lower limb vascular surgeries.

Material: The study included 50 people, 28 males and 22 females. The control group consisted of 25 patients who did not have any rehabilitation after discharge from hospital and the study group encompassed 25 subjects who continued post-hospital rehabilitation.

Methods: All patients underwent surgeries due to vascular diseases and received a rehabilitation during hospitalization. The study group continued rehabilitation after discharge. Quality of life was assessed 4 months after surgical procedures.

Results: Four months after surgery, the quality of life increased statistically significantly in the study group ($p<0.05$), as compared to the control group. Substantial improvement was observed by 18 (72%) study group patients and 5 (20%) controls. Lack of improvement was noted by 7 (28%) study group patients and 15 (60%) controls. Worsening of the condition was reported by 5 (20%) study group patients and none of controls.

Conclusion: A long-term rehabilitation program significantly improves the quality of life after surgeries.

Key words: vascular diseases, quality of life, cardiac rehabilitation

Introduction

Cardiovascular diseases are the most common cause of death in developed countries; 90% of vascular diseases are caused by generalised atherosclerosis, which contributes to the majority of myocardial infarction cases as well as peripheral artery and lower extremity artery diseases [1].

One of the most common vascular diseases is venous thromboembolism (VTE), including deep vein thrombosis (DVT) and pulmonary embolism (PE) [2]. DVT is an asymptomatic disease, which often leads to pulmonary embolism, i.e. constriction or obliteration of the pulmonary artery lumen or its branches by a thrombus formed in lower extremity deep veins. The symptoms of PE are usually sudden in onset and include thoracic pain, dry cough, fainting or haemoptysis [3,4,5,6,7].

The main cause of peripheral artery diseases (PADs) is unhealthy lifestyle, bad diet, tobacco smoking and sedentary work. Over 97% of cases of artery diseases are caused by peripheral artery occlusive disease (PAOD) [8]. The condition is chronic, inflammatory and progressive. In PAOD, the arterial walls thicken due to lipid and calcium deposits, which form the atheromatous plaque. Thickenings occlude the vascular lumen, which impairs the blood flow. Atherosclerosis causes about 90% of cases of carotid artery occlusion and stenosis. The lesions are predominantly located at the common carotid artery bifurcation and

the initial parts of internal and external carotid arteries. This location of atherosclerotic lesions is extremely dangerous as breaking loose of the thrombus can lead to cerebral ischaemia and stroke [9]. Unlike atherosclerosis of other arterial regions, PAOD of the lower extremities is generally asymptomatic. The most characteristic symptom of atheromatous lesions in the lower extremity arteries is intermittent claudication, i.e. myalgia of the lower limbs and buttocks, occurring during walking and forcing patients to stop. In most cases, after several-minute rest, patients can continue walking. The distance of walking that causes the pain is called the claudication distance. Pain occurs always below the location of lesions [10,11]. An aneurysm is a segmental widening of the artery, often caused by degenerative lesions of the vascular walls. The long-term degenerative process within the arterial wall can lead to its continuous proliferation resulting in vessel rupturing. Reduced blood flow within aneurysms of the peripheral vessels can lead to paramural thrombi and severe complications connected with compression of the adjacent structures, e.g. nerves or veins [12].

Surgical treatment of vascular lesions in lower extremities

The arteries with atherosclerotic occlusive lesions or other diseases impairing the blood flow are most commonly treated with bypass surgery. Only in special cases, the affected portions of the vessel are resected and replaced, which is common in extensive aneurysms. The selection of an appropriate treatment option is mainly dependent on the location of lesions, extent of stenosis, efficiency of peripheral circulation and general health status of patients [13]. Bypass grafts (using a synthetic material or from the patient`s own natural vein) enable the blood flow along the occluded portion, from the occlusion site to the peripheral part of the vessel. Aortofemoral bypass is most frequently used for occlusion of the common iliac artery. The atherosclerotic lesions are commonly located in the lower part of the abdominal artery, in iliac arteries and in the segments of femoral arteries just below the inguinal ligament. In such cases, aortic bifemoral bypass is performed, which connects the lower part of the abdominal aorta with both femoral arteries and is the treatment of choice due to high incidences of other concomitant vascular diseases, e.g. aneurysms or aortic occlusions reaching the branching off of renal arteries. However, when there are no special contraindications, the patency of arteries in this region can be restored without bypass grafting [14]. In cases of severe arterial insufficiency within the trunk, large abdominal adhesions, aorta calcification, neoplastic changes, risk of postoperative complications associated with circulatory failure and other risk factors, in which aortofemoral bypass is not possible, axillobifemoral bypass can be performed. The anastomosis is created on the axillary artery between the first rib and the teres major muscle and on the common femoral arteries just below their bifurcation; the subcutaneous tunnel is formed along the medial axillary and lateral abdominal line, through which the artificial artery is threaded. The reverse U graft running above the pubic symphisis is used between the two femoral arteries. [15].

Femorofemoral bypass grafting can be used in patients with occlusion of one iliac artery. Moreover, this is also the method of choice in patients with too high risk associated with abdominal surgical procedures, e.g. adhesions between intestinal loops, abdominal infections, occluded arms of the aortobifemoral prosthesis, injuries to the iliac artery [4,15]. In cases of extensive atherosclerotic lesions, femoropopliteal bypasses are performed to save the extremity. The most effective method is to use a bypass from the patient`s own reverse

vein as the valves do not have to be destroyed and continuity and integrity of the vascular endothelium is fully preserved, which reduces the risk of bypass rejection.

In the majority of aneurysm surgeries, the aneurysms resected and the blood flow restored, often by implanting a vascular prosthesis. In cases of femoral artery aneurysms, it is not necessary to remove the entire segment of the vessel. An intravascular prosthesis is implanted. Aneurysms affecting crural arteries seldom rupture. When the entire aneurysm is filled with a thrombus, and the superficial femoral artery as well as the distal portion of the popliteal artery are patent, saphenous vein bypass surgery is performed [15,16].

Patient quality of life after vascular procedures

The quality of life is frequently reduced in patients with vascular diseases and after vascular surgeries, which is usually associated with pain, mainly in the lower extremities, weakened muscular strength and reduced cardio-respiratory efficiency. Patients with vascular conditions experience easy fatigue, have oedemas and ulcerations of the limbs, which can even lead to their amputations. Intermittent claudication significantly hinders everyday functioning. All the above deficits adversely affect their well-being, limit their involvement in social and professional life, and worsen their financial situation; moreover, they can become dependent on others [17,18].

The World Health Organisation (WHO) defines the quality of life (QoL) as "the individual`s perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, norms and interests" [19]. Based on that definition, the factors determining QoL of a particular patient are singled out, which include physical and mental status, the degree of independence, social relations and the environment.

Analysis of this subjective assessment of the patient regarding his/her health and satisfaction with life is an essential element of planning the treatment and verifying its efficacy, which helps to improve the quality of medical services, increase the treatment efficacy and systematically revise the goals of therapy [20].

Physiotherapy in vascular diseases

The preoperative period

During the preoperative period, it is essential to provide the patient with information about the disease, surgery as well as pre- and post-procedure rehabilitation. Preoperative physiotherapy is to reduce the risk of thromboembolic and respiratory complications and to improve the circulatory efficiency in the lower extremities. Moreover, strengthening of the patient`s general efficiency, especially in the upper extremities to prepare him/her for walking with crutches and education concerning healthy lifestyle are relevant [20,21].

Ambulatory patients treated for arterial diseases, qualified for surgery, are recommended to do march trainings. In the critical ischaemic period (Fontaine III or IV), march trainings are substituted with intermittent pneumatic compression, which increases the arterial pressure within the ankles, thus improving peripheral artery perfusion and tissue nutrition [23,24].

The postoperative period

Deep vein thrombosis is the most serious risk associated with the majority of surgical procedures. Beside antithrombotic prevention, postoperative physiotherapy involves maintenance of patient`s circulatory efficiency and preparation for assuming an upright position. Furthermore, body posture is corrected and walking ergonomics improved.

Postoperative physiotherapy is divided into two periods: early (hospital) and later (ambulatory/ outpatient) [23].

Hospitalisation

It is essential to initiate physiotherapeutic management already during the first day after vascular surgeries. The recommended procedures include antithrombotic and respiratory exercises, instructions concerning effective coughing, relaxation exercises and activities increasing general efficiency. Emphasis should be placed on teaching proper limb loading and correction of body posture. The elements of compression therapy, such as compression tights and stockings as well as bandaging, should also be included [22,23].

The outpatient period

The management of the late period of rehabilitation is to improve the blood supply in the ischaemic limb and to restore its strength and muscular mass lost due to chronic ischaemia. The major goals of secondary prevention of lower extremity ischaemia is to develop good habits of care of ischemic limbs, modify lifestyle to eliminate the risk factors of atherosclerosis and introduce regular physical activity. Systematic trainings lead to beneficial compensations within the peripheral circulation by forming the collateral circulation, which improves the circulation in the limbs. Moreover, trainings should aim at improvement of neuromuscular coordination, effective and ergonomic cycles of walking, which directly lengthens the claudication distance [22,23,25].

The only physical procedure supporting the venous pump is calf muscle electrostimulation (the 5Hz constant current and 300μs impulses) [21,24,26].

Furthermore, some massages can be applied. The most common method used for antithrombotic prophylaxis is pneumatic compression, which supports the muscular pump and improves the outflow of retained blood. Intermittent pneumatic compression can result in even 30-fold improvement in blood flow rhythmicity, stimulates fibrolysis and prevents vascular damage [22,25].

Materials

The study encompassed 50 individuals with diagnosed vascular lesions within the lower extremities, including 28 men and 22 women; the control group consisted of 25 individuals with no post-hospital physiotherapy and the study group included the remaining 25 patients undergoing outpatient rehabilitation.

Methods

Study design

A diagnostic survey was performed between April and May 2017. The institutions involved were:

- Outpatient clinic of vascular diseases, Radom, Wysoka 12 St.
- Outpatient clinic of vascular disease, Radom, Tochterman 1 St.
- Non-public Health Care Centre "Dekamed" limited company, Radom.

Prior to the study, approval from the authorities of the institutions involved and informed consent of patients were obtained.

Inclusion criteria:

- history of bypass grafting within the lower extremities (aortofemoral, femorofemoral, femoropopliteal, peripheral artery bypass)
- 3-4 months after procedures
- lack of skeletoarticular diseases affecting the patient`s physical efficiency, lack of chronic diseases except for risk factors of vascular diseases
- no postoperative complications,
- mental capacities and verbal communication skills sufficient for unaided participation in the study.

Exclusion criteria:

- vascular surgeries other than the ones above (e.g. thrombectomy, varicotomy, restoration of arterial patency)
- less than 3 or more than 4 months after procedures,
- skeletoarticular diseases significantly impairing the patient`s efficiency or chronic diseases other than the risk factors of vascular diseases,
- lack of mental efficiency and difficulties in communication, which make unaided participation impossible,
- lack of patient`s informed consent for participation.

Study tools

The role of physiotherapy after vascular surgeries was assessed using the authors` questionnaire containing general information about patients (age, gender, place of residence), clinical history (cause of surgery and duration of hospitalisation) and information regarding postoperative physiotherapy. After the completion of rehabilitation (4 months) respondents were asked about the quality of everyday functioning.

1. Socio-demographic characteristics of respondents

The study encompassed 50 individuals who underwent vascular bypass surgeries within the lower extremities. The respondents were divided into two equal groups: study and control. The study group included 25 individuals provided with outpatient physiotherapy after surgery while the control group consisted of 25 respondents without post-surgery physiotherapy.

The study group included 11 women (44.0%) and 14 men (56.0%) (Table 1). According to age, the respondents were divided into three groups; group 1 - 44.0% of respondents (n=11) aged 44-57 years; group 2 - 36.0% (n-9) aged 58-67 years and group 3 - 20% of respondents (n=5) aged 68-78 years (Table 1). Moreover, 28.0% of respondents (n=7) lived in the country, another 28% in towns with less than 10 000 inhabitants, 24.0% (n=6) in towns with 10-50 000 inhabitants and 20% (n=5) in towns with over 50 000 inhabitants. In the control group, 44.0% (n=11) were women and 56.0% (n=14) men (Table 1).

According to age, the control group respondents were divided into three groups: group 1 - 56.0% (n=14) aged 44-57 years, group 2 - 28.0% (n=7) aged 58-67 years and group 3 - 16.0% (n=4) aged 68-78 years (Table 1). Moreover, 36.0% of respondents of the control group (n=9) lived in the country while 24.0% (n=6) in towns <10 000 inhabitants, 24.0%(n=6) - in towns with 10-5-000 inhabitants and 16.% (n=4) in towns > 50 000 inhabitants (Table 1).

2. Characteristics of respondents according to the history of diseases and hospital treatment

Disease symptoms

In the study group, 76.0% (n=19) respondents reported preoperative limb heaviness, 68.0% (n=17) - limb oedemas, 80% (n=20) - intermittent claudication, 16.0% (n=4) - limb tingling, 80.0% (n=20) easy fatigue during everyday activities, 32% (n=8) - limb cyanosis and only 4% (n=1) did not report any symptoms (Table 2).

In the control group, 56.0% (n=14) of respondents reported limb heaviness before surgery, 68.0% (n=17) - limb oedema, 76.0% (n=29)- intermittent claudication, 68.0% (n=17) - limb tingling, 44.0% (n=11) - easy fatigue during everyday activities, 16.0% (n=4)- limb cyanosis while 8% (n=2) did not feel any symptoms (Table 2).

Qualification for surgery

In the study group, 36.0% (n=9) of patients underwent surgeries due to atherosclerotic lesions, 28.0% (n=7) due to aneurysms, another 28.0% due

Table 1. Characteristics of respondents according to gender, age and place of residenc

Variables		Study group		Control group	
		n	%	n	%
gender	female	11	44.0	11	440
	male	14	56.0	14	56.0
age	44-57 years	11	44.0	14	56.0
	58-67 years	9	36.0	7	28.0
	68-78 years	5	20.0	4	16.0
Place of residence	village	7	28.0	9	36.0
	town<10 000	7	28.0	6	24.0
	town 10 000-50 000	6	24.0	6	24.0
	town > 50 000	5	20.0	4	16.0

Table 2. Characteristics of respondents according to pre-operative symptoms

Variables		Study group		Control group	
		n	%	n	%
symptoms	lower limb heaviness	19	76.0	14	56.0
	lower limb oedema	17	68.0	17	68.0
	intermittent claudication	20	80.0	19	76.0
	tingling	4	16.0	17	68.0
	easy fatigue	20	80.0	11	44.0
	lower limb cyanosis	8	32.0	4	16.0
	no symptoms	1	4.0	2	8.0

to arterial embolism and 8% (n=2) due to venous embolism. In the control group, 36.0% (n=9) underwent surgeries due to aneurysms, another 36.0% due to atherosclerotic lesions, and 28.0% (n=7) due to arterial embolism (Table 3).

Hospitalisation

The study group respondents were divided into 3 groups according to the duration of hospitalisation: 32.0% (n=8) of respondents hospitalised for 2-3 days, 48.0% (n=12) for 4-7 days and 20% (n=5) > one week. The nursing care administered included surgical wound care - 96.0% (n=24), positioning - 56.0% (n=14), chest percussion - 36.0% (n=9), compression therapy - 32.0% (n=8). All the respondents were subjected to physiotherapy during hospitalisation: antithrombotic exercises - 84.0% (n=21), exercises of the lower extremities - 60.0% (n=15), respiratory exercises - 48.0% (n=12), learning effective coughing - 16.0% (n=4), lifting to upright position - 84.0% (n=21), and march trainings -52.0% (n=13). Moreover, 72.0% (n-18) of respondents were lifted into upright position on postoperative day 1-2, 24.0% (n=6) during day 3-5 while 4.0% (n=1) after more than 6 days.

The control group respondents were divided into 3 groups according to the duration of hospitalisation: 60.0% (n-15) of respondents hospitalised for 2-3 days 32.0% - 4-7 days and 8.0%

Table 3. Characteristics of respondents according to the cause of surgery

Variables		Study group		Control group	
		n	%	n	%
Cause of surgery	Aneurysm	7	28.0	9	36.0
	atherosclerotic lesions	9	36.0	9	36.0
	arterial embolism	7	28.0	7	28.0
	venous embolism	2	8.0	0	0.0

(n=2) - > one week. The nursing care in this group involved: surgical wound care - 84.0% (n=21), positioning - 28.0% (n=7), chest percussion - 32.0% (n=8), and 4.0% (n=1) reported no care activities. Furthermore, in the control group 16.0% (n=4) of respondents declared no physiotherapy during hospitalisation; 52.0% had antithrombotic exercises, 40.0% (n=10) - active slow exercises of lower limbs, 48.0% (n=12) - respiratory exercises, 48.0% (n=12) lifting to upright position, and 48.0% (n-12) march trainings. In the control group, 88.0% (n=22) of respondents were lifted to upright position on postoperative day 1-2, 12,0% (n=3) on day 3-5 and 0.0% (n=0) after more than 6 days (Table 4.).

Table 4. Characteristics of respondents according to the course of hospitalisation

Variables		Study group		Control group	
		n	%	n	%
Duration of hospitalisation	2-3 days	8	32.0	15	60.0
	4-7 days	12	48	8	32.0
	> 7 days	5	20.0	2	8.0
Nursing care	wound care	24	96.0	21	84.0
	positioning	14	56.0	7	28.0
	chest percussion	9	36.0	8	32.0
	compression therapy	8	32.0	0	0.0
	none	0	0.0	4	16.0
Physiotherapeutic activities	antithrombotic exercises	21	84.0	13	52.0
	lower limb exercises	15	60.0	10	40.0
	respiratory exercises	12	48.0	12	48.0
	effective coughing	4	16.0	0	0.0
	lifting to upright position	21	84.0	12	48.0
	march training	13	52.0	12	48.0
	none	0	0.0	4	16.0
Onset of lifting to upright position	1-2 days	18	72.0	22	88.0
	3-5 days	6	24.0	3	12.0
	> 6 days	1	4.0	0	0.0

3. Characteristics of the study group according to outpatient rehabilitation

In the study group, 44.0% (n=11) of individuals exercised at home according to the physiotherapist`s instructions provided in hospital while 56.0% (n=14) of respondents abandoned exercises. None of the respondents had additional private physiotherapeutic services. The majority of respondents (64%, n=16) used physiotherapeutic services for 2 weeks; 20.0% (n=5) for one month and 16.0% (n=4) continue to be under the physiotherapist`s care. Almost all the respondents (92.0%, n=23) had march trainings, 64.0%(n=16) lower limb resistance exercises, 52.0% (n=13) active slow exercises, 68.0% (n=17) respiratory exercises, 56.0% (n=14) surgical wound **protection;** in 16.0% (n=4) of respondents intermittent pneumatic compression was used; in 32.0% (n=8) therapeutic massages and 16.0% (n=4) of respondents used compression stockings/tights. None of the respondents had electrostimulation (Table 5).

Table 5. Characteristics of the study group according to outpatient physiotherapy

Variables		Study group	
		n	%
Exercises recommended by physiotherapists	yes	11	44.0
	No	14	56.0
Additional private physiotherapy	yes	0	0.0
	No	25	100.0
Duration of physiotherapy	2 weeks	16	64.0
	1 month	5	20.0
	ongoing	4	16.0
Physiotherapeutic activities	march training	23	92.0
	lower limb exercises with resistance	16	64.0
	active slow exercises	13	52.0
	respiratory exercises	17	68.0
	wound protection	14	56.0
	electrostimulation	0	0.0
	intermittent pneumatic compression	4	16.0
	therapeutic massage	8	32.0
	compression tights/stockings	4	16.0

Analysis of results

None of the individuals undergoing physiotherapy after discharge noticed adverse changes (slight or significant) in their health status; 28.0% (n=7) of respondents stated that their health status did not change after discharge, 28.0% (n=7) reported improvement and 44.0% (n=11) felt substantially better. The above result was statistically significant (p=0.00049). In the group without outpatient physiotherapy, 8.0% (n=2) of respondents felt that their health deteriorated, 12.0% (n=3) felt slightly worse and 60.0% (n=15) did not notice any changes; moreover, 16.0% (n=4) observed improvement while 4.0% (n=1) felt significantly better. The above result was statistically significant (p=0.00016). The intergroup differences were statistically significant ($p<0.05$), which shows that individuals with outpatient physiotherapy were much more satisfied with the improvement in their health status, as compared to individuals without outpatient physiotherapy (Table 6).

Conclusions

The study results demonstrated that the use of outpatient physiotherapy for several months after vascular surgeries of the lower extremities substantially improved the physical efficiency of patients. All the respondents reported that physiotherapy favourably affected their functioning and quality of life. The health-related factors, such as the severity of pain, oedemas, heaviness of lower limbs, and the claudication distance, improved in the study group as compared to the control group. The quality of life index after the cycle of physiotherapy was significantly higher in respondents undergoing outpatient rehabilitation,

Table 6. Distribution of results according to assessment of health status 3-4 months after surgery

Changes in health status	Study group		Control group	
	n	%	n	%
substantially worse	0	0.0	2	8.0
slightly worse	0	0.0	3	12.0
no change	7	28.0	15	60.0
better	7	28.0	4	16.0
substantially better	11	44.0	1	4.0
p	p=0.00049		p=0.00016	
	p<0.05			

as compared to those who did not have outpatient rehabilitation.

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