Lower limb oedema in vascular disease

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ABSTRACT

Introduction: Lower limb oedema is a significant problem in vascular diseases. Due to the localization, it greatly hampers normal mobility affecting quality of life.
Purpose: To evaluate the frequency of lower limb swelling in the course of vascular diseases and related complaints.
Materials and methods: 30 patients (16 men; aged 26-87 (mean 59)) admitted to Wroclaw University Hospital; suffering from idiopathic lymphatic insufficiency, chronic venous insufficiency-related swelling and swelling caused by atheromatosis and thrombosis.
Results: 8 patients (27%) had lymphoedema, of whom 5 were diagnosed with swelling after giving birth and 3 were hospitalized not knowing the reason of the lymphatic system dysfunction. 9 patients (30%) had swelling in arteriosclerosis and venous failure, and only 4 patients (13%) were treated because of deep vein thrombosis.
Conclusions: General health serves as the main indicator of correlation between loss of mobility and mean swelling size. There was no statistically significant correlation between general health and gender. Cutaneous pain (22% respondents) was the main complaint followed by limb deformity (15%) and lack of knowledge (18%). Declared physical activity among study population was high.
Key words: oedema, vascular diseases, quality of life

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INTRODUCTION

Contemporary medicine offers an array of diagnostic tools and methods that can significantly prolong life. Despite this, complex treatment methods do not always lead to recovery or clearing of chronic symptoms. Offered care should not only aim at eliminating disease, but also improving quality of life of the sufferers. This applies to cases where the disease alters the patient's body image, as in angiological diseases with oedema. Disease can affect quality of life in many spheres, affecting the sufferer's work activity, social and family functioning, leisure activities or even sex and procreation.

Lymphoedema results from insufficiency of the lymphatic system when transport of lymph and other substances becomes hindered or inhibited. The accumulation of excessive fluid in the interstitial spaces can be local or systemic [1, 2].

In 1991, Olszewski [3] systematized oedema according to the underlying causes. Oedema does not have to be a disease in itself. It can occur in the course of other diseases or be a result of the disease process. Primary oedema is caused by anomalies of the lymphatic system and secondary oedema is a complication of various diseases, for instance cancer, venous insufficiency, deep vein thrombosis and superficial thrombosis, injury, infection or fibrosis [3].

Swelling appearing in the course of chronic failure of superficial veins is a mixed swelling and often mirrors the progress of the disease. It most often involves the foot and talocrural joint, The presentation corresponds with the C4 to C6 CEAP stage classification (Classification of Chronic Venous Insufficiency of the Lower Limbs) and depends on the degree of obstruction and collaterant circulation. The increased amount of extracellular fluid in chronic venous insufficiency is explained by increased venous pressure, particularly around the medial ankle. Moreover, the muscular pump, an auxiliary element moving blood and lymph, is also impaired in the course of this disease [4].

Deep vein thrombosis is the most frequent cause of lower limb swelling. Virchow triad (blood vessel damage, deceleration of blood flow and changes in its composition) is implicated.

A thrombus impairs blood flow, increases venous pressure and interferes with lymphatic drainage, triggering oedema. The swelling in vein thrombosis is often unilateral, painful and violaceous. In as many as 50% of patients, the course of the disease is asymptomatic, therefore, prophylaxis in the most susceptible patients is necessary [5].

Lower limb swelling often accompanies obliterative arteriosclerosis; considerable thickening of the intima is present. Lack of blood flow causes ischaemia, necrosis and may necessitate amputation. Gangrene stems from breakdown of microcirculation resulting from abnormal vascular motor activity and blood distribution which does not reach to the nutritious capillaries of the skin. Defensive mechanisms including stimulations of leucocytes, platelets and endothelial cells are activated. The result of this situation is the closure of capillaries and increased permeability, causing tissue swelling and release of active substance from leukocytes [6].

The nature of the swelling changes as the condition progresses. At the beginning, swelling can be described as soft-doughy, then it becomes hard as cornification of the epidermis progresses. In late, advanced stages subcutaneous fibrosis, and lymphatic leakage lead to elephantiasis of the limb [3-5]. Complications often arise from negligent treatment. Prophylaxis is essential. When preventive measures are not instituted skin callosity, erythema, decreased local skin resistance, general discomfort and neoplasm develop [7].

Swelling and its complications affect sufferers' well-being, their attitude towards the disease and the way they handle the disease. Not only symptoms, their intensity and prognosis influence patients' view of the disease but also the opinion of the therapeutic team. The therapeutic team will give the patient a standardized diagnostic opinion, but also their individual specific grading system.

In most cases, oedema is incurable, however not life threatening, and it has a detrimental psychological effect on the patient. Apart from somatic problems, there are psychological problems. The patient with swelling has difficulty performing daily tasks, leisure and social activities including relationship problems. Summertime is particularly difficult as summer clothes and footwear poorly disguise swellings. Disfigured patients feel alienated and isolate themselves in their homes. Appropriate therapy brings changes to their lifestyle and lowers their quality of life [8, 9].

The aim of study was to evaluate the frequency of lower limb swellings in the course of vascular diseases and related complaints. The impact of swellings on the range of movement in the ankle joint, pain level and psychical discomfort were also studied.

MATERIALS AND METHODS

Thirty patients with lymphoedema or vascular-lymphatic oedema admitted to Wroclaw

University Hospital at Borowska Street were enrolled. The group consisted of 14 women and 16 men aged 26-87 years (mean age 59), suffering from idiopathic lymphatic insufficiency, chronic venous insufficiency-related swelling and swelling caused by atheromatosis and thrombosis. Exclusion criteria included swelling that did not restrict the range of movement in the talocrural joint, and other conditions, i.e. osteoarticular injuries, rheumatic diseases, and inflammation.

A newly-designed questionnaire was used to measure the quality of life. It consisted of 37 multiple choice questions divided into 4 sections. Additionally, the patients had their ankle joint mobility range assessed and increased circumference measured with a tape. The measurements were designed to detect any anomalies resulting from swelling, such as decreased mobility range and increased circumference of the affected limb compared with the other limb. The Bioethical Committee of Wroclaw Medical University approved the study.

Statistical evaluation

StatSoft Inc. (2005) STATISTICA and Microsoft Office Excel 2007 were used. Statistical measures included arithmetic mean, standard deviation and standard error (significance of 0.05). For each trial, the Kolmogorov-Smirnov test (K-S) was used to assess equality of probability distribution. Pearson's correlation coefficient was used to test linear correlation between the variables. Chi-square test was used to compare qualitative variables.

RESULTS

The investigation included 30 respondents. 8 (27%) had lymphoedema, of whom 5 were diagnosed with swelling after giving birth and 3 were hospitalized not knowing the reason of the lymphatic system dysfunction. 9 patients (30%) had swelling in arteriosclerosis and venous failure, and only 4 patients (13%) were treated because of deep vein thrombosis.

Table 1. Health status depending on gender.

Gender	**Physical health**				**All**
	good	**rather good**	**rather bad**	**bad**	
M	2.133333	5.33333	6.93333	1.60000	16.0000
F	1.866667	4.66667	6.06667	1.40000	14.0000
All groups	4.000000	10.00000	13.0000	3.00000	30.0000

Summary: quantity; Quantity: Cells >10; Chi ^{2} Pearson: 4.36298, df=3, p=.224849

Table 2. Disease-related limitations in patients' life.

	Type of limitation	**Percentage of answers**
1	Disfigurement of the limb	15 %
2	Reaction of people	6 %
3	Cutaneous pain	22 %
4	Pain of the limb due to disease	12 %
5	Open wounds and ulcers	7 %
6	Lack of knowledge or lack of specialists' interest	18 %
7	Problems with access to rehabilitation centers offering specialist care	15 %
8	Expensive direct care, short-term treatment	5 %

Table 3. Differences in circumference of selected sections of the lower limb.

Difference in circumference	**Descriptive statistics**						
	N	**X**	**Median**	**Min.**	**Max.**	**SD**	**SE Error**
Above the foot	25	23.63	23	17.75	29.75	2.56	0.51
Below the ankle joint	26	1.83	1.38	0.25	7.25	1.68	0.33
Above the ankle joint	26	1.53	39.75	0.00	5.00	1.21	0.23
Lower leg	22	5.05	1.50	0.00	38.25	10.19	2.17
Above the knee joint	11	2.95	1.25	0.00	11.75	3.58	1.07
Thigh	9	3.64	1.75	0.00	16.25	5.07	1.68

Table 4. Changes in mobility.

Variable	Descriptive statistics							
	N	**X**	**Median**	**Min**	**Max**	**Variance**	**SD**	**SE**
D in relation to the ankle joint - extension	24	0.28	0.29	0.00	0.67	0.04	0.20	0.04
D in relation to the ankle joint - flexion	24	0.18	0.14	0.00	0.63	0.02	0.12	0.03
D in relation to the ankle joint - inversion	24	0.38	0.33	0.00	1.00	0.05	0.23	0.05
D in relation to the ankle joint- eversion	24	0.38	0.33	0.00	1.00	0.06	0.25	0.05
D in relation to the knee joint	11	0.35	0.35	0.15	0.56	0.02	0.13	0.04

Table 5. Correlation between swelling size and loss of mobility and state of health of patients.

Correlation between two variables	R	P
Health at the moment vs. swelling size	r=0.1567	p=0.408
Health at the moment vs. relative loss of mobility	r=0.2139	p=0.256

All subjects were asked to rate their health on a scale of: good, rather good, rather bad and bad. 43% patients chose ‘rather bad’, 10% described their health as bad and only 13% rated it as good. Overall more than half of the respondents had a negative perception of their health, which is suggestive of a low quality of life. More women than men (3:1) marked ’good ’: More men chose ‘bad’ (3:0). When tested with the Chi-square test, the difference between men and women proved, however, to be statistically insignificant (Table 1).

Analysis of physical activity undertaken by the respondents found that 44% of patients with venous insufficiency said they lead an active lifestyle. The entire population of persons with deep-vein thrombosis also confirmed having an active lifestyle. Almost 80% of patients with lower limb ischemia or diseases of the lymphatic system were physically active. Physical activity does not unfortunately equal ‘leaving the house’. 38% persons with diseases of the lymphatic system and 22% with chronic venous failure were reluctant to go out because of present swelling. There were no such observations in respondents with deep vein thrombosis, and only 10% in patients with lower limb ischemia. When evaluating their health, patients indicated the biggest disease-related limitations they faced in their daily living. The most frequent answer (22%) was skin pain resulting from overstretching. Lack of knowledge about oedema or specialists’ lack of interest was also found to be an obstacle (18%). Limb deformity was mentioned by 15% of subjects (Table 2). Measurements of the healthy and affected limb (foot, under and above the ankle joint, lower leg, above the knee joint, thigh) revealed that the foot (x=23.63) was the most often affected. The ankle joint (26 cases) was the most common site of swellings. Measurements of circumference performed at the same level were analyzed with the Pearson test in order to determine correlation between swelling size and pain as measured on the VAS scale. The correlation (r=0.03, p=0.858) was found to be positive. Nevertheless, it was not significant enough, so the results were interpreted as a lack of correlation, meaning that the changes in size did not change patients’ perception of pain (Table 3).

Changes in ankle joint mobility: Slight changes were noted in dorsiflexion and the biggest changes during return motion and supination (Table 4). The Pearson test (p=0.357, r=0.174) was used to analyze the correlation between loss of mobility and limb volume. The result was positive: the greater the differences in circumference, the greater the relative loss of mobility. Subjective evaluation of health in respect to physical limitations as determined by the swelling size and loss of joint mobility with normal distribution tests was positive, but statistically insignificant. Health status at any given time was more affected by the relative loss of mobility rather than swelling size (Table 5).

DISCUSSION

The general health of patients with various vascular disease-related oedemas of the lower limbs is conditioned, in many cases (statistically insignificant) by various foreseeable factors such as limitations resulting from worse physical fitness, psychological problems, pain and age [10].

Women battling with disfigurements usually have lower self-esteem. Physical disfigurement did not prove to have any particular effect on their health. More women than men (on a statistically insignificant level) rated their health as good and none rated it as bad. These findings (verified with the Pearson's Chi-square test) do not confirm the hypothesis that women face a bigger problem due to their self-consciousness about their image.

Raciborski et al. [11] studied the quality of life of patients with deep vein thrombosis who developed oedema. The subjects were divided into two groups, where one group was treated solely pharmacologically and the other also had physiotherapy. Visible changes were reported in both groups. The greatest were noted just above the medial ankle. Our study confirms the results. 87% of the subjects developed lymphatic disorders around the ankle joint, but the biggest differences in circumference were reported in the foot – 23.63cm. In Raciborski's study, there was a significant improvement in the quality of life when swelling, heavy feeling and fatigue of the limb were reduced. Similar conclusions can be drawn from our study. The very occurrence of swelling has a detrimental effect on quality of life. The correlation between mean value of the swelling and quality of life is positive (r=0.1567), but statistically insignificant.

Górski et al. [12] indicated that swelling negatively impacted quality of life mostly in the sphere of social life. Swelling impacts vitality and physical efficiency. Physical activity is unfortunately not equivalent with leaving the house. 38% persons with diseases of the lymphatic system and 22% with chronic venous failure were reluctant to go out because of swelling. There were no such observations in respondents with deep vein thrombosis, and only 10% in patients with lower limb ischemia.

Limb swelling also affects emotional stability. Bieda et al. [13] found that patients suffering from chronic swelling more frequently experience anxiety, depression, relationship problems, problems at work and in social life. They often give up their hobbies due to the lymphoedema and seek psychotherapy. In our study, 73% of the subjects were forced to give up, to some extent, their hobbies because of lymphoedema but none sought professional psychological help.

The restrictions in mobility due to lymphoedema of the upper limb, as reported by Stanisławek A et al. [14], were slight and did not affect quality of life. A difference in limb circumference was reported in 19% of the cases with only a minimal effect on quality of life (13% cases). Bieda et al. [13] drew similar conclusions, reporting a positive effect of increased mobility of joints on patients' life. It seems that loss of joint mobility has a more detrimental effect on patients' perception of health than the size of the swelling itself. This suggests that these are interconnected and the subject should be addresses in future research.

CONCLUSIONS

1. General health status serves as the main indicator of correlation between loss of mobility and mean difference in swelling size. Other factors need to be considered: age, disease specificity, duration, pain, and trophic changes.
2. No statistically significant correlation between general health and gender was found. Women, just as men, experience problems with their health.
3. Cutaneous pain (22% respondents) was the main complaint followed by limb deformity (15%) and lack of knowledge (18%).

Conflicts of interest

We declare that we have no conflicts of interest.

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