

Post-operative Venous Thromboembolism in Patients Operated on for Aorto-iliac Obstruction and Abdominal Aortic Aneurysm, and the Application of Pharmacological Thromboprophylaxis

K. Pawlaczyk ^{a,*}, M. Gabriel ^b, L. Dzieciuchowicz ^b, M. Stanisic ^b, B. Begier-Krasinska ^a, Z. Gabriel ^b, M. Olejniczak-Nowakowska ^c, T. Urbaneck ^d

^a Department of Hypertensiology, Angiology and Internal Diseases, Medical University, Długa 1-2, Poznan, Poland

^b Department of General and Vascular Surgery, Medical University, Długa 1-2, Poznan, Poland

^c Department of Cancer Prevention, Medical University of Silesia, Piekarska 18, 41-902 Bytom, Poland

^d Department of General and Vascular Surgery, Medical University of Silesia, Ziolowa 45/47, 40-635 Katowice, Poland

WHAT THIS PAPER ADDS

Patients undergoing large abdominal operations, as well as alloplastic knee and hip joint replacement, are recommended to continue antithrombotic prophylaxis for a period of 14–28 days following the surgery, regardless of whether the patient stays in hospital or at home. In relation to applying antithrombotic prophylaxis, vascular surgery seems to be an exception. This state of affairs may be surprising, as in the vast majority of cases the patients operated on may be included in the moderate or high risk group in terms of developing thromboembolic complications.

Objective/background: In light of the methods generally used to assess the risk of venous thromboembolism (VTE), major vascular operations should be regarded as high risk procedures. Nevertheless, no principles for implementing and maintaining thromboprophylaxis have so far been developed. The aim of this study was to determine the frequency and nature of VTE occurrence in patients routinely applying pharmacological thromboprophylaxis following implantation of an aorto-bifemoral prosthesis.

Methods: The prospective non-randomized study included 105 patients with aortoiliac obstruction and 119 patients with abdominal aortic aneurysm (AAA) treated surgically. During hospitalization pharmacological thromboprophylactic procedures were observed. A duplex test was performed on the day before surgery, on the day of discharge, and 30 days after the patients had left the hospital.

Results: VTE was detected in 18.1% of the patients with aortoiliac obstruction (9.5% of patients during hospitalization and 8.6% of patients after discharge). VTE was diagnosed in 21.0% of patients with AAA (15.1% of patients during hospitalization and 5.9% of patients after discharge). The incidence of VTE was comparable in both groups, both during hospitalization ($p = .51$) and in the 30 day period following the end of hospitalization ($p = .48$). It is advisable that before hospital discharge routine duplex ultrasonography tests should be conducted on the venous systems of all patients who have undergone major vascular operations.

Conclusions: It is likewise advisable to consider whether thromboprophylaxis for vascular patients should be extended beyond their discharge from hospital.

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INTRODUCTION

Patients undergoing major abdominal operations, as well as alloplastic knee and hip joint replacement, are advised to continue thromboprophylaxis for a period of 14–28 days

following the surgery, whether they stay in hospital or at home. This indication derives from the observation that there is an increased frequency of venous thromboembolism (VTE) developing in this patient group in the early post-operative period.¹

In the case of thromboprophylaxis, vascular surgery seems to be an exception. This state of affairs may be surprising, as in the vast majority of cases the patients operated on may be included in moderate or high risk groups, in terms of developing VTE.² The most important risk factors for VTE development in this patient group include the following: advanced

* Corresponding author.

E-mail address: kati2911@poczta.onet.eu (K. Pawlaczyk).

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age, surgery time exceeding 2–3 hours in most cases, intra-operative limb ischemia, revascularization syndrome, considerable blood loss, the need for packed red blood cells (PRBCs) and plasma transfusions, hypercoagulable state, vein injuries, a history of thromboembolic episodes, limb edema inhibiting venous outflow, and a lengthy period of immobilization, which, on the one hand, is caused by the extent of the surgery and, on the other, by the difficulty in obtaining access to rehabilitation procedures.^{3,4}

Few research studies are available and the considerable diversity of their results have contributed to a limited impact of the thromboprophylactic recommendations set for vascular patients in the ninth edition of the antithrombotic guidelines issued by the American College of Chest Physicians.^{5,6} According to these recommendations, major vascular operations should be considered high risk procedures in terms of VTE development. However, owing to doubts regarding the research methodology, routine application of thromboprophylaxis has been specified as a level 1C recommendation.⁶

The purpose of the present study was to specify the nature and frequency of VTE found in patients undergoing major abdominal operations and those who are routinely given pharmacological thromboprophylaxis.

METHODS

The prospective non-randomized study included two groups: group 1 included 105 patients (20 women, 85 men) with aortoiliac obstruction; group 2 included 119 (15 women, 104 men) patients with abdominal aortic aneurysms (AAA) and/or aneurysms of the iliac arteries.

The patients were treated surgically at the Department of General and Vascular Surgery, Poznan Medical University, in 2014. The characteristics of the patients included in the study are shown in Tables 1 and 2.

Table 1. Pre-operative patient data and laboratory test results ($p < 0.05$).

	Group 1	Group 2	p
Age (y)	63.0 ± 7.8	67.0 ± 7.9	<.01
BMI	25.8 ± 4.2	26.6 ± 4.6	.02
Ejection fraction (%)	50.0 ± 7.8	50.0 ± 7.1	1.00
Hemoglobin (mmol/L)	8.5 ± 1.2	8.8 ± 1.1	1.00
Hematocrit (L/L)	0.41 ± 0.05	0.42 ± 0.30	1.00
Creatinine (μmol/L)	85.2 ± 31.5	90.0 ± 49.8	.03
Urea (mmol/L)	5.15 ± 3.01	5.62 ± 2.70	.45
ALAT (U/L)	23.5 ± 22.5	20.5 ± 15.1	.25
ASPAT (U/L)	21.0 ± 34.4	21.0 ± 16.7	.42
APTT (s)	32.2 ± 6.5	32.6 ± 8.8	.15
INR	1.00 ± 0.13	1.0 ± 0.3	.10
Thrombocytes (10 ⁹ /L)	251.0 ± 97.0	207.0 ± 80.4	<.01
Fibrinogen (mg/dL)	352.0 ± 117.3	330.0 ± 121.3	.09
Total cholesterol (mmol/L)	4.74 ± 1.40	4.78 ± 1.20	.09
Triglycerides (mmol/L)	1.28 ± 0.97	1.40 ± 0.90	1.00

Note. Data are median ± SD. BMI = body mass index; ALAT = alanine transaminase; ASPAT = glutamic oxaloacetic transaminase; APTT = activated partial thromboplastin time; INR = international randomized ratio.

Table 2. Frequency of risk factors for developing atherosclerosis and thromboembolism ($p < 0.05$).

Risk factor	Frequency (%)		p
	Group 1	Group 2	
Tobacco smoking	49.52	36.14	<.01
Angina pectoris	29.52	31.93	.14
Post-infarction patient	27.62	29.41	.21
Hypertension	64.76	70.59	.87
Cerebral ischemia symptoms	12.38	16.81	.67
Diabetes	19.05	15.12	.01
Chronic obstructive pulmonary disease	6.67	8.24	.87
Renal failure	3.81	1.68	.13
Neoplastic disease	7.61	10.08	.06
Necrotic lesions in limbs	34.62	0.84	<.01
Superficial and/or deep venous incompetence	8.78	5.88	.45
Presence of post-thrombotic scars in superficial and/or deep veins	4.77	6.12	.35

Exclusion criteria included: no consent given to participate in the study or to apply thromboprophylaxis using low molecular weight heparin; urgent surgical procedures; history of heparin induced thrombocytopenia; long-term antithrombotic drug administration; the patient left hospital without undergoing Duplex ultrasound (DUS); the patient died for reasons other than pulmonary embolism (PE) before a DUS test could be performed on the venous system; and the patient's general status indicated little chance of survival for >1 month.

The lower extremity veins were examined by means of DUS.⁷ The tests were carried out by two vascular surgeons, each with at least 15 years experience in the field of DUS, having performed >40,000 Doppler tests of the venous system. The study equipment included a Mindrai DC-8 linear probe operating at a frequency of 4–12 MHz and a convex probe working at a frequency of 3–6 MHz. The iliac veins were examined in the supine position.

The veins of the lower limbs were examined in the standing position. Each time, the assessment covered the common and external iliac veins, the femoral and deep femoral veins, the popliteal vein, the anterior and posterior tibial veins, and intramuscular veins of the gastrocnemius calf muscle and the soleus muscle. Each vessel was examined in the transverse and longitudinal plane. Thrombosis was diagnosed if echogenic structures were observed in the veins that failed to collapse under probe pressure or veins that failed to collapse under probe pressure. An additional sign confirming the diagnosis of thrombosis was no or incomplete filling of the lumen with color. The latter method formed the basis for the diagnosis of thrombosis in the iliac veins. If in doubt, the patient's examination was carried out independently by both ultrasound specialists, and, if necessary, it was repeated after 24 hours.

A DUS scan of the veins was routinely performed three times, one day before the surgery, on the day of discharge, and 30 days after discharge from hospital. Additional tests

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