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The Pulmonary Thromboembolism as a Risk of Surgical Treatments and the Role of Anticoagulant Prophylaxis

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ABSTRACT

Objective: Our objective is to show the number of patients with postoperative pulmonary thromboembolism (PPTE) treated in Intensive care unit of Clinic for pulmonary diseases and TB "Podhrastovi" in three-year period : from June 1, 2011 - June 1, 2014 and to indicate the importance of various surgical operations in the development of pulmonary thromboembolism (PTE). **Material and methods:** This is the retrospective study which shows the number of patients with PPTE treated in Intensive care unit of Clinic for pulmonary diseases and TB "Podhrastovi" in three-year period : from 01.06.2011.-01.06.2014. It represents the number of these patients, per cent of patients with PPTE of total patients with PTE, age and sex of patients, type of surgery, period expressed in days from surgery to diagnosis of PTE, presence of deep venous thrombosis (DVT) of lower extremities , massiveness of PPTE e.g. level of pulmonary artery with embolus. **Results:** In three-year period 232 patients with PTE were treated in Intensive care unit of Clinic "Podhrastovi". 60 of them or 25.86% were patients with PPTE: 24 males or 40% middle-aged 58.5 years, and 36 females or 60% middle-aged 56.3 years. PPTE developed in 15 patients with abdominal, 11 with urologic, 8 with gynecologic, 15 with orthopedic, 4 with cardiologic, 2 with vascular, 3 with neurosurgical, 1 with glandular and 1 with oral operations. The average period from operation to diagnosis of PPTE was 10.5 days for women, and 13.8 days for men. Only two patients had acute DVT after operation (one man and one woman), and five had amnesias of previous DVT or PTE. The level or the site of pulmonary embolus was different from segmental to main branches of pulmonary artery. **Conclusion:** different surgical operations are the big risk factor for the development of PTE. There is great significance of anticoagulant prophylaxis before surgery even in patients with no anamnesis of previous DVT or PTE.

Key words: postoperative, pulmonary thromboembolism, surgery.

1. INTRODUCTION

Embolism of the pulmonary artery or one of its branches is the most striking and characteristic appearance of thromboembolic disease (1-6). According to textbooks and most of literature in most cases the starting point of the embolus is phlebothrombosis or thrombophlebitis of veins of lower extremities (1-5).

It is often difficult to determine the starting point of pulmonary emboli. Pulmonary embolism is very common nowadays, and favoring factors for its occurrence are the chronic diseases and therefore a long lying (bed rest), which leads to the development of phlebothrombosis and a large number of different surgical operations (1-6)

1.1. The etiology of pulmonary thromboembolism:

- Phlebothrombosis and thrombophlebitis of lower extremities veins
- Phlebothrombosis of pelvic and abdominal veins usually after surgery
- Thrombophlebitis and phlebothrombosis of veins of lower extremities after trauma and various surgical operations
- Intracardiac thrombosis of the right cardiac ventricle

- Thrombosis of the pulmonary artery or some of its branches in situ
- There are other, less common types of emboli: e.g. tissue cells, fat, oil, gas embolism and the like (1)

1.2. Risk factors for deep vein thrombosis and pulmonary thromboembolism

Factors dependent on the patient:

- Age over 40 years
- Obesity
- Immobilization / bed rest/- lying in bed for longer than 4 days
- Deep vein thrombosis or pulmonary embolism in history
- Thrombophilia, deficiency of antithrombin(AT) III factor, protein C, protein S; lupus anticoagulant, resistance to activated protein C, hemocistatinemia (2, 4, 5)

Factors dependent on the type of illness or surgery

- Trauma or surgery: especially the pelvis, hip, leg
- Malignant processes-particularly in the pelvis, abdomen, primary or metastatic
- Heart failure

- Recent myocardial infarction
- Hormonal therapy (estrogen, progesterone)
- Using the contraceptive pills
- Paraplegia
- Severe infection
- Intestinal inflammations
- Polycythemia
- Paraproteinemia
- Behcet's disease
- Paroxysmal nocturnal hemoglobinuria (2, 4, 6)

Although etiology and common risk factors for pulmonary thromboembolism are well known there is little data about frequency of postoperative pulmonary thromboembolism after different surgical operations.

2. OBJECTIVE

Our objective is to show the number of patients with postoperative pulmonary thromboembolism (PPTE) treated in Intensive care unit of Clinic for pulmonary diseases an TB "Podhrastovi" in three-year period : from June 1, 2011 - June 1, 2014 and to indicate the importance of various surgical operations in the development of pulmonary thromboembolism (PTE).

3. MATERIAL AND METHODS

This is the retrospective study which shows the number of patients with postoperative pulmonary thromboembolism treated in Intensive care unit of Clinic for pulmonary diseases an TB "Podhrastovi" in three-year period: 01.06.2011.-01.06.2014. It represents the number of these patients, per cent of patients with postoperative pulmonary thromboembolism of total patients with pulmonary thromboembolism, age and sex of patients, type of surgery, period expressed in days from surgery to clinical presence of pulmonary thromboembolism, presence of deep venous thrombosis (DVT) of lower extremities, massiveness of PPTE e.g. level of pulmonary artery with embolus: segmental, lobar, main branches of pulmonary artery; unilateral, bilateral.

4. RESULTS

In three-year period 232 patients with PTE were treated in Intensive care unit of Clinic "Podhrastovi". 60 of them or 25.86% were patients with postoperative PTE. Among them there were 24 males or 40% middle-aged 58.5 years, and 36 females or 60% middle-aged 56.3 years.

Only one man had DVT (deep venous phlebothrombosis) (after orthopedic surgery), and five of them had anamnesis about

Figure 1. Type and number of surgical operations before development of PTE. PTE developed in 15 patients with abdominal, 11 with urologic, 8 with gynecologic, 15 with orthopedic, 4 with cardiologic, 2 with vascular, 3 with neurosurgical, 1 with glandular (breast) and 1 with orl operations

Figure 2. The average period in days from surgery to the development of PTE. PTE developed in one to thirty days after operation, on average for abdominal operations it was 19 days, for urologic 5, for gynecologic 10, for orthopedic 15.5, for cardiologic 13, for vascular 4.5, for neurosurgical 18.5, for glandular 10 and for orl operations 10 days after operation. PPTE developed on average 10 days in women, and 14 days after operation in men.

previous DVT (one with abdominal, one with vascular, one with orthopedic and two with cardiology surgery). Only one woman had DVT (after orthopedic surgery), and no one had anamnesis about previous DVT or PTE.

Figure 3. The level or site of pulmonary embolus according to the type of surgery in women. The level of pulmonary embolism is different, from segmental to main branches of pulmonary artery with different number of patients according to operation.

Patients were subjected to different types of surgical opera-

Figure 4. The level or site of pulmonary embolus according to the type of surgery in men. The level of pulmonary embolism is different, from segmental to main branches of pulmonary artery with different number of patients according to operation

tions which are presented on Figure 1. PTE developed in different interval after operation which is presented on the Figure 2.

Massiveness of PPTE e.g., the site or level of embolus was different- from segmental to main branches of pulmonary artery which is shown on Figure 3 and Figure 4.

5. DISCUSSION

There is notably increasing number of patients with pulmonary thromboembolism in recent years treated in Clinic for pulmonary diseases and TB "Podhrastovi". We are not yet sure whether it is real increasing or it is matter of better diagnos-

tics. In three-year period 232 patients with PTE were treated in Intensive care unit of this clinic. 60 of them or 25.86% were patients where PTE developed after different types of surgical operations. We intended with this study to point out the significance and frequency of postoperative pulmonary thromboembolism, and to indicate that surgical operations of different type are significant etiologic and risk factor for the development of PTE.

This study has several limitations. First of all we did not have real data about regularity of preoperative and postoperative prophylaxis with anticoagulants, early rising from bed after surgery (mechanical prophylaxis), we did not have data about intraoperative or early postoperative deaths caused possibly by PTE. Furthermore, not small number of patients with postoperative PTE was treated in corresponding surgical clinic under the control of pulmonologist from our clinic, and released home to continue anticoagulant therapy under the control of pulmonologist in outpatient department.

Although common risk factors for the development of PTE are well known, studied and confirmed in clinical practice there are not enough data in literature about postoperative DVT or PTE out of controlled studies (7). Many authors indicate the significance of preoperative anticoagulant prophylaxis (7, 8, 9, 10).

One big prospective study was done by group of authors on 75 771 patients with vascular and orthopedic operations from 1996 to 2001 in Veteran Health Administration Hospital (7). The average age was 65 years and 96% of patients were males. Major comorbidities included diabetes mellitus, chronic obstructive pulmonary disease, and congestive heart failure. Symptomatic PTE was diagnosed in 805 patients (0.68%) and varied significantly with procedures: 0.14% for carotid endarterectomy to 1.34% for total hip arthroplasty. In our study we dealt with patients of both sex (60% of them women), average age was 58.5 years for men, and aged 56.3 years for women, and patients were subjected to different types of surgery. We did not examine comorbidities before operation. We dealt with patients not prospectively, but only with surgically treated patients with different operations with diagnosed PPTE to indicate the importance of surgery to the development of PTE. These authors (7) indicate the postoperative importance of pneumonia and other infections, including urinary tract infection, myocardial infarction. We did not find such factors of such importance before the development of PPTE.

Only two patients in our study had DVT after operation (one man and one woman), but in all others were not able to find the starting point of embolus. So we think that the preoperative and postoperative prophylaxis (either anticoagulant, or mechanical-early rise from bed) is of the most significance, especially in patients with risk factors for DVT or PTE, even

it is only the expected lying in bed (bed-rest) longer than 4 days. There is the need for one long prospective study in different surgical clinic for the assessment of more factors (age, sex, preoperative diseases, type and site of operation, postoperative complications, duration of bed-rest, anticoagulant and mechanical prophylaxis etc.) to give the more realistic picture of postoperative pulmonary thromboembolism.

6. CONCLUSION

Different surgical operations are the big risk factor for the development of PTE. There is great significance of anticoagulant prophylaxis before surgery even in patients with no anamnesis of previous DVT or PTE.

CONFLICT OF INTEREST: NONE DECLARED.

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