

The Thrombo-embolic Risk in Surgery

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Summary

Postoperative deep-vein thrombosis can lead to fatal pulmonary embolism on one side, and the development of a disabling postthrombotic syndrome, which can occur after some time. General thrombo-embolic prophylaxis can reduce the risk of postoperative thrombo-embolic complications. Predisposing factors include age, obesity, immobilization and recumbency. Cardiovascular diseases, malignant neoplasms, venous disorders, diseases associated with increased viscosity of blood, past deep-vein thrombosis and pulmonary embolisms, some infectious diseases with raised fibrinogen levels, and inherited or acquired clotting factor deficiency syndromes (antithrombin III, protein C, protein S) have an elevated risk of thrombosis. The surgery itself, when taking more than 20 minutes and performed under general anesthesia, is a major risk factor, as proven initiation of thrombosis is often on the operation table. Patients receiving regional or local anesthesia have a clearly reduced risk of thrombosis. After general surgery without thrombosis prophylaxis, a deep-vein thrombosis can be demonstrated by the fibrinogen uptake test in about 30% of all patients over the age of 40. After abdominal surgery an incidence of thrombosis of 14–33%, and after hip surgery an incidence of nearly 50%, have been established by means of the fibrinogen uptake test. However only 10% of these thromboses are expressed clinically. We therefore recommend Liquid Crystal Contact Thermography, which has a sensitivity of 94% and a specificity of over 80%, as a non-invasive, easily performed screening method in the diagnosis of deep-vein thrombosis. Apart from the physical methods, the use of heparin is also indicated in thrombo-embolic prophylaxis. Today mainly low-molecular heparin is recommended since its half-life is longer than that of conventional heparin, and thus only one injection a day is required in the abdominal surgery ward.

Key words

Predisposing factors – High-risk patients – Low molecular weight heparins – Liquid crystal contact thermography

Introduction

Surgical interventions have been carried out for centuries, the risk of postoperative thrombo-embolic complications, however, was not recognized until the 19th century. Hippocrates, Aristotle and Galen were occupied with the phenomenon of coagulation, but neither discovered the etiological roots of thrombosis nor established a relationship between thrombosis and embolic blockage of the pulmonary artery. It was not until 1784 that *John Hunter* described a concept of the genesis of pulmonary embolism, and in 1840 the British physician *Joy* described deep-vein thrombosis (1).

Somewhere around 1850 the German pathologist *Rudolf Virchow* recognized thrombotic embolism as a separate entity, added the name of the disease to existing medical terminology, and described the causative pathogenic factors. This triad of Virchow has, in principle, not lost its validity. *Virchow* described 3 factors that contribute to the genesis of thrombosis:

1. Damaged endothelia of blood-vessels
2. Slowing down of blood flow
3. Existing clotting disorder

Research on thrombosis has since uncovered further factors and situations that lead to an increased risk of thrombosis. One of the main risk factors is the surgical intervention itself. The generally accepted fact that postoperative, and often fatal, pulmonary embolism is neither unexpected nor inevitable, since a specific prophylaxis is available, has found its way into the mind of the surgeon only in the last few years. The goal of general thrombo-embolic prophylaxis during the postoperative phase is to diminish the frequency of disabling post-thrombotic syndromes and eliminate the number of fatal pulmonary embolisms. An inventory of expenses (cost of general thrombo-embolic prophylaxis) and interest (reduction in the number of fatal pulmonary embolisms) is not permissible for understandable reasons. Nevertheless it is the duty of a surgeon preoperatively to recognize patients at *normal risk* and those at *high risk* of possible thrombo-embolic complications, and to treat them accordingly.

I. Thrombo-embolic risk

1. Predisposing factors

a. Age

Official mortality statistics show that age plays an important role in the incidence of venous thrombosis and pulmonary embolism. Postoperative pulmonary embolism is more frequent in patients older than 40. *Sevitt* found a