

Advances of Prevention and Nursing of Deep Venous Thrombosis after Gynecological Tumor Operation

Yongxian Wei*, Lijin Tan

Baise People's Hospital, Baise 533000, Guangxi Provinces, China

Abstract: E mainly includes deep venous thrombosis(DVT) and pulmonary thromboembolism(PTE). DVT is caused by the thrombogenesis of red blood cells, platelets and fibrous protein which obstructs the venous backflow leading to inflammatory changes in the wall of the vein. PTE is caused by the caducous blood clots of DVT that runs with the blood to the lungs. Because DVT and PTE are the venous thromboembolic disease process in two stages, the prevention of DVT and PTE is very important for preventing the rapid onset of PTE and high mortality rate of the postoperative complications. The changes of female hormones and the blood concentration and lipid metabolism disorders make venous thromboembolism more likely to occur during pregnancy. Once the pulmonary vessels were blocked, the patients'life would be threatened severely. To find a more effective way to prevent postoperative venous thrombosis in gynecology we review the prevention and treatment of deep venous thrombosis after gynecological surgery in this paper.

Keywords: Gynecological tumor; Surgery; Deep vein thrombosis; Nursing progress

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***Corresponding author:** Yongxian Wei, hzp2838972@163.com

Venous thromboembolism(VTE) refers to the abnormal clot of blood in a vein to form a thrombus, which blocks the return of venous blood and causes inflammatory changes in the vein wall. Gynecological cancer patients are prone to deep vein thrombosis(DVT) due to the disease itself and long-term bed rest during postoperative recovery. Deep venous thrombosis of

lower limbs is one of the most serious complications after gynecological pelvic surgery^[1]. The incidence of venous thromboembolism after gynecological surgery is 7%-45%^[2-3]. It is not rare to have lower extremity deep venous thrombosis after gynecological surgery in clinical work. It is because of the large changes in the internal environment of women's hormones, blood concentrations and lipid metabolism disorders after surgery, which makes venous thromboembolism easily be induced. The most severe clinical feature and sign is pulmonary embolism, with a mortality rate of 9%-50%. In recent years, the prevention of postoperative DVT has become a routine nursing task and has drawn increasing attention from managers. The author will summarize the nursing progress in the prevention of deep vein thrombosis after gynecological tumor surgery.

1 Mechanism of Deep vein thrombosis

Many factors lead to that lower limb muscles lose normal function of contraction and are in a relaxed state, resulting in blood flow retardation and lower limb venous thrombosis: the abnormalities in blood anticoagulant and fibrinolytic system of patients; spinal or general anesthesia during the operation, which caused peripheral veins of the patient to dilate; venous velocity becomes slow ; micro lacerations in weak venous walls; during the operation tissue factors increasingly release coagulation factors like platelet, fibrinose *etc*, resulting in increased Coagulability of blood; postoperative incision pain, bed rest, and other factors. According to the literature, high blood coagulation, vascular wall damage, and slow blood flow are the three major factors in the formation of DVT^[4] which can occur in the main body veins and most commonly in the lower limbs. Malignant tumors will increase the risk of venous

thrombosis in the lower limbs of patients^[5]. Combined use of oral contraceptives, hormone replacement therapy and other factors, patients with gynecological diseases can increase the chance of DVT by 25%^[6]. In China the incidence rate of deep vein thrombosis of patients under laparoscopic surgery is about 18% to 26%^[7]. Clinically, only 10% to 17% of DVT patients have obvious symptoms.

In the past, due to the limited information and some misunderstandings in the medical community and the difference in the level of awareness of deep vein thrombosis, the rate of misdiagnosis of deep vein thrombosis was really high. First, it is the judgment of the time of onset. In the beginning, thrombosis does not prevent the return of venous blood because of the existence of a large number of collateral circulations in the venous system. Only when the thrombosis generates into a particular extent and the proximal and distal collateral circulation has an opening, can it appear the clinical symptoms of lower limb swelling. Once clinically diagnosed, the onset time often exceeds several days. Therefore, early diagnosis is very important. However, each medical institution's awareness and concept of deep vein thrombosis of the lower limbs are different, so as the treatment options and prevention methods.

2 Methods of risk assessment for deep vein thrombosis

Different assessment scales of thrombus risk have different predictive value for the prevention of DVT^[8]. When patients are admitted to hospital, we will use the Cprini assessment scale of thrombus risk from the patient's age, weight, history, presence or absence of surgical incentives, time in bed, etc. The project evaluates and classifies into 4 groups: low risk (0 to 1 point), intermediate risk (2 points), high risk (3 to 4 points), and extremely high risk (≥ 5 points). In addition, the patients who will go through surgery are evaluated before, during, and after surgery. If the scoring results of patients are low-risk, and the duty nurse will guide the patients to improve their diet structure. Meanwhile, the nurse will formulate a reasonable activity plan to strengthen the implementation of education of venous thrombosis-related knowledge. If the score is of ≥ 5 points, a warning sign is placed on the bedside of the patients. In addition to early intervention measures, determination of blood plasma D-dimer, color Doppler, ultrasound exploration, and other related tests are

used to confirm whether DVT has occurred. The circumference of the same part of the upper leg and the lower leg so as to learn about the feeling, temperature, color, pulse intensity, etc. During each shift, the duty nurse squeezes the patients' calves, asking patients if there is any discomfort such as soreness of deep tissue muscle, instructing the patients in bed to perform physical exercises on and out of the bed. When necessary, the patients who have no active bleeding and abnormal coagulation and liver function, use medical intervention based on the doctor's advice before the surgery. Meanwhile, the nurse encourages patients and their family to actively participate in the prevention and control of thrombosis risk. The head nurse monitors the implementation of preventive measures and measures for patients with medium to high thrombus risk in the department, and requires the frequency of assessment once a week for medium-risk patients and once every three days for patients with high-risk. For the patients in high risk, written shift on the bedside should be strictly performed for high-risk patient. Guolan Wei^[9] evaluated the relevant potential risks before and after surgery by the Autar scale, and then selected patients with high risk, and targeted nursing measures based on the degree of risk, effectively avoiding clinical blindness from nursing intervention, reducing the pressure of clinical medical staff, reducing the medical cost of patients. Meanwhile, Wei made full use of the advantages of predictive care, and gave targeted nursing intervention to patients with different levels of risk to avoid the occurrence of DVT, which is beneficial to improve the quality of life of patients and the prognosis. The use of preventive nursing measures combined with the assessment form of DVT risk factor in clinical nursing can effectively improve blood circulation of pregnant or delivery woman; reduce blood viscosity; avoid platelet aggregation, prevent the occurrence of DVT. And the intervention effect is good^[10].

3 Advances in prevention and care of deep vein thrombosis

3.1 Research on common physical methods

3.1.1 Intermittent pneumatic compression

Intermittent pneumatic compression (IPC) uses an air-compression pump to pump air into a multistage sleeve. Through repeated inflation and deflation operations, the pressure in the sleeve increases step

by step, squeezing and massaging the deep muscles of the lower limbs, blood vessels and lymphatic vessels, thereby accelerating blood circulation of the lower limbs, effectively preventing stasis of venous blood and the occurrence of DVT. After the patient returns to the ward and the vital signs have been stabilized, he will be given one preventive treatment, and then be treated every 8 hours for 48 hours. The intensity of treatment is based on the patient's tolerance 30 minute a time. During the treatment process, a six-cavity step pressurization was performed strictly in the order of bilateral ankle-calf-thigh and close attention will be paid to the swelling of the patient's lower limbs in order to adjust the pressure and intensity of the treatment device in time to avoid iatrogenic injuries^[11]. The ACCP Antithrombotic Therapy and Prevention of Thrombosis, 9th ed proposed that patients with low risk of Caprini score ≤ 2 should be recommended to use IPC^[12-13]. In the course of IPC therapy, the duty nurse should pay attention to the warmth of both lower limbs of the patient; keep the indoor humidity and temperature appropriate; explain the purpose, role, and precautions of using IPC, and get the cooperation of patients and their families so as to achieve the best effect.

3.1.2 Graduated compression stockings

Graduated compression stockings(GCS) can accelerate blood backflow in the lower limbs through pressure gradient to prevent venous blood stasis of lower limb. It is necessary to be aware of the contraindications of GCS when using it. Summary of the NICE guideline. Heart and Guideline for the Prevention and Management of Thrombus in Surgery in China, suspect or prove that those patients who have their senses damaged caused by diseases of peripheral nerves and vessel or other factors, who have any local factors such as dermatitis, gangrene and recent surgery of skin transplantation, allergies to GCS materials, combined heart failure, severe leg edema, pulmonary edema, deformity of lower limb caused by congestive heart failure and other factors, should not use GCS. In addition, the use of GCS in low-risk groups with a Cabrini risk assessment score of less than 2 can also achieve good prevention effect of thrombosis. In the clinical process of using elastic stocks can help the venous blood return to the heart, as well as effectively reduce clinical symptoms such as pain and swelling or even make them disappear, which will improve the rate of cure^[14-16].

3.1.3 Ankle Exercise

Ankle exercise (AE) method can simulate the pump of calf muscle at the time when normal people walk through the contraction and relaxation of soleus and gastrocnemius muscles, which plays an important role in accelerating the filling of blood and backflow of lymph fluid. At present, this method is often used in clinical practice to guide patients to exercise lower limbs. The ankle joint can perform plantar flexion and dorsiflexion, and can also be combined with inversion and abduction, which is activity of circumduction. Sochart confirmed that the dorsiflexion and plantar flexion of the lower limbs, inversion and abduction, and "circumduction" are the three methods that make femoral venous blood flow velocity higher than at rest when doing passive or active movement, among which the active "circumduction" can produce maximum blood flow velocity^[17]. Venous return of lower limb relies on myocardial contractility, chest and abdominal pressure during breathing, and activity of gastrocnemius pump during walking. Studies have confirmed that when AE is combined with deep breathing, the femoral vein blood flow velocity is 2.6 times high than it does at rest^[18]. Therefore, it can achieve the best effect if the nurse instructs the patient to actively "circumduct" combined with deep breath. In clinical practice, the nursing staff instructed the patient to perform activities with the "maximum range of motion". However, due to postoperative pain and immobilization the patients only had slight movements and did not strictly regulate the rules of activity range of ankle joint, which did not bring the effect of contracting muscles. Previous studies have suggested that the order of "circumduction" is dorsiflexion—inversion—plantar flexion—eversion, and the range of motion is 20°, 30°, 40°, 30° in turn^[19]. Patients can increase the blood venous flow velocity of the femoral vein, with different activity frequencies per minute. But each patient and family member cannot fully grasp the explanation and guidance of the nurse because 's their education and cognition are different. So the compliance of postoperative ankle exercise is not high. Therefore, our duty nurse should have a plan for teaching before surgery, demonstrating the methods of ankle exercise. Daily assessment of patients' voluntary exercise is needed so as to acknowledge the level of understanding of the patients and their families through education by multiple channels and methods, such as

training, reduce the incidence of DVT, and help promote postoperative rehabilitation for the patients^[20].

3.1.4 Neuromuscular electrical stimulation

Tucker believes that neuromuscular electrical stimulation (NMES) is a technology that uses low-frequency currents through electrodes to stimulate specific muscle groups to twitch or contract, and then achieves the purpose of treatment^[21]. It is expected to become a new method for the hospital, family and community to prevent thrombosis. The electrode stimulates the common peroneal nerve and simultaneously activates the tibialis, peroneus longus, and lateral gastrocnemius muscle groups to contract together, causing the venous system of calf to generate similar isometric contraction pressure, which results in an increase in blood flow velocity which is doing better than only contracting the gastrocnemius muscle. In his experiment, when he was using electrical stimulation in the range of 1 to 40 mA and 1 to 5 Hz, the femoral vein blood flow, blood flow velocity, and capillary blood flow in the skin all increased significantly. Williams compared NMES with IPC and showed that NMES is better than IPC in improving blood circulation of leg^[22]. Warwick and Dewbury believe that the changes in blood flow velocity brought by NMES are closer to the physiological changes during human activity than IPC does^[23]. NMES comes with a storage battery which compact and convenient, with disposable electrodes which are clean and hygienic. There is no need to restrict activities when using, and it will not cause any discomfort. It is expected to become a new method for preventing thrombosis in hospitals, families and communities.

3.2 Studies on Drug Intervention

The latest international ACCP thrombolysis guideline does not recommend thrombolysis as the preferred treatment method for deep venous thrombosis of the lower limbs. First, it is because of the lagging clinical performance of venous thrombosis and ineffective thrombolytic drugs for organic thrombus. Second, the risk of bleeding from thrombolytic drugs is very high. Particularly, there is a risk of major bleeding in patients who are undergoing postoperative surgery. Moreover, a large number of comparative studies show that the efficacy of thrombolytic therapy is not better than anticoagulation therapy's. Therefore, anticoagulation therapy is generally preferred as long as the patient doesn't have bleeding tendency and coagulation

problems. Anticoagulation therapy can prevent the thrombus from spreading or forming new ones, but anticoagulation can't dissolve the thrombus quickly or effectively relieve the symptoms. And it may cause patients with post-thrombosis syndrome^[24]. It often occurs months to years after the formation of venous thrombosis in the lower limbs. It is mainly manifested by venous claudication, varicose, pigmentation, changes of subcutaneous tissue fiber, and severe ulcers, which affects the quality of patients' life. At present, scholars have conducted research on the treatment of venous thrombosis of the lower limbs with the combination of traditional Chinese and western medicine, which have achieved certain clinical effects^[25]. The Guidelines for the Prevention and Treatment of Thrombotic Diseases in China recommends that Low Molecular Heparin can be given to conduct anticoagulant therapy before pelvic surgery^[26]. During the use of anticoagulant drugs, patients should be closely monitored in case of bleeding tendency if there is a bleeding point, such as skin puncture sites, gums and other parts. The patient should not be instructed to use a hard-pointed object to dig the nostril and ear canal, instead of using a soft-bristled toothbrush to brush the teeth, so as to avoid unnecessary trauma. The diet should be fresh and digestible to prevent the digestive tract from food, and foods rich in fiber can be eaten maintain smooth stools.

All in all, apart from providing basic nursing for the patients after going through gynecological abdominal and pelvic surgery, a suitable assessment scale of thrombosis should be used during admission and before, during and after the surgery. According to the assessment, early physical methods should be conducted such as guidance for ankle exercise, pressure pump of intermittent inflation, combined with anticoagulant drugs when necessary so as to reduce the incidence of venous thrombosis in the lower limbs. Compared with traditional methods such as turning the body over on time and manual massage, the clinical effect of it is more significant, which effectively reduces the incidence of venous thrombosis of lower limbs. It is worthy of clinical promotion.

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