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REVIEW ARTICLE

The Role of Prophylaxis for Preventing Venous Thromboembolism in Major Urological Surgery and Nursing Management

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Abstract
Venous thromboembolism (VTE) that includes both pulmonary embolism (PE) and deep vein thrombosis (DVT), is a common complication in major urological oncology surgery and it is one of the significant causes of mortality and morbidity. Effective and quality nursing care and practices at every stage of the perioperative process, from the patient's initial clinical admission to post-discharge home care can prevent potential complications. The most effective and the easiest way to prevent VTE is to perform a proper risk assessment. Nurses providing care to patients undergoing major urological surgery should conduct a risk assessment through an effective nursing anamnesis in the preoperative period and take necessary precautions for individuals at risk for VTE. These precautions should be planned to encompass the intraoperative and postoperative periods as well. The primary reasons that increase susceptibility to VTE include the pelvic region being the focus of urological surgeries, the majority of patients being elderly, surgeries typically being performed in the lithotomy position, and the relatively extended period of postoperative immobilization. Risk classification, according to national and international guidelines, is categorized as 'high' or 'very high' risk, with prophylaxis post-discharge considered only for a subset of patients at 'very high risk.' VTE prevention is generally achieved through two main approaches: pharmacological and non-pharmacological prophylaxis. Pharmacological prophylaxis reduces the likelihood of VTE, but it is crucial to balance the risk of bleeding with the patient's experience. Therefore, this review aims to evaluate the role of prophylaxis and nursing management for preventing VTE in major urological surgical procedures.

Keywords: major urological surgery, venous thromboembolism, nursing management.

INTRODUCTION

Venous thromboembolism (VTE), encompassing both pulmonary embolism (PE) and deep vein thrombosis (DVT), is a common complication in major urological oncology surgery and it is a significant cause of mortality and morbidity. Postoperative VTE is defined as venous thrombus (DVT) in the deep pelvic or lower extremity veins or as pulmonary embolism (PE). There are many risk factors for VTE. The most common that are included active cancer, pelvic surgery, advanced age, and consequent immobility. In

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addition, immobilities that are associated with drains and catheters placed during surgery are other significant risk factors in the postoperative period. Currently, in patients with active urological cancer, recent surgical intervention remains the most common risk factor for developing VTE in the postoperative period (1).

It was reported that approximately 200,000 major urological cancer surgeries were performed annually in the United States about 10 years ago, and while VTE (Venous Thromboembolism) presents a significant risk within urology, this risk increases 5-7 times in major oncological surgical procedures (2). The global burden of urologic cancer, especially in aging societies, has led to a substantial impact on public health worldwide. Nearly 13% of all cancers are urologic cancers, which primarily include prostate, bladder, kidney, and testicular cancers. According to the World Cancer Research Fund International, prostate cancer is the 2nd most frequent cancer in males, with nearly 1.4 million new cases in 2020. Bladder, kidney, and testicular cancer were ranked as the 10th, 14th, and 20th most common cancers worldwide, with nearly 573,000, 430,000, and 74,500 new cases in 2020 (3). Moreover, VTE continues to be one of the most common causes of death in the 30-day postoperative period for urological cancers not only in the United States but globally. In the cohort study by Logan et al. (2023), VTE is similarly reported as the fifth most common cause of perioperative mortality (4). Recent evidence points out that the majority of thromboembolic events occur after discharge. This evidence highlights the necessity of extending the traditional duration of VTE prophylaxis in this patient group undergoing major urological cancer surgery (1).

Each surgical procedure poses a risk for venous thromboembolism (VTE) for patients. The primary risk factors for VTE in surgical patients include the type of surgery (cardiothoracic, orthopedic), the duration of the surgery, use of a tourniquet, patient positioning during surgery, and immobility of the lower extremities (5). In the study by Edeer et al. (2018), it is reported that 62.1% of patients in surgical clinics are at high risk for VTE (6). Among patients undergoing major abdominal surgery without prophylaxis, 15-40% develop asymptomatic deep vein thrombosis (DVT) detected through screening. For major surgeries, the rate is 40-60% (7).

The National Institute for Health and Care Excellence (NICE), in its 2018 guidelines, recommends extended thromboprophylaxis. According to this guideline, patients undergoing major abdominopelvic cancer surgery should receive low molecular weight heparin treatment for 28 days postoperatively. The European Association of Urology (EAU) Guidelines also recommend 28 days for certain procedures, but the recommended duration of prophylaxis varies depending on the procedure (8). Additionally, the current EAU guidelines define major bleeding as bleeding that requires reoperation or intervention (e.g., angioembolization). Changes in hemoglobin levels or the need for transfusion are not considered major bleeding. When selecting prophylaxis, factors other than the risk of major bleeding should be taken into account, including the patient's clinical condition, the complications of the method, the patient's preference and compliance, and the level of VTE risk. In the European Association of Urology guidelines, a VTE risk classification model for urological, general, and gynecological surgeries is proposed based on high-evidence studies. Patients are classified as low, medium, and high risk. Similarly, the guidelines of other key national bodies, such as the American Urological Association (AUA), emphasize the need for risk assessment when deciding to implement VTE prophylaxis. It is recommended that post-discharge prophylaxis should only be considered for some of the 'high-risk' patients. The risk classification can be found in Table 1 (1).

Despite the presence of international and national guidelines for the implementation of VTE (Venous Thromboembolism) prophylaxis, these guidelines recommend assessing the patient's VTE risk and identifying risk factors in the preoperative period (5). Advanced age, the presence of surgical procedures, and malignancies are major risk factors for VTE. Among VTE complications, pulmonary embolism (PE) is a rare but feared major complication. Patients undergoing major urological cancer surgery are at high risk for VTE (9).However, adherence to these guidelines is weak (10). Identifying VTE risk factors begins from the patient's initial outpatient visit and continues through the preoperative, intraoperative, postoperative periods, and even into the discharge and home care process. According to the National Venous Thromboembolism Prophylaxis and Treatment Guidelines (2010), 64% of hospitalized surgical patients are reported to be at risk for DVT (Deep Vein Thrombosis), but only 59% receive thromboprophylaxis (1). Petrozzello (2017) states that 25% to 60% of patients undergoing surgery without appropriate VTE prophylaxis develop DVT (11). VTE, which has high mortality and morbidity rates and it is one of the postoperative complications, is extremely important in major

urological surgical procedures. Therefore, early diagnosis of VTE can prevent many issues since it is preventable. The risk of developing VTE should be distinguished with a reliable risk assessment system to avoid health problems and financial burdens caused by VTE. Various risk assessment models are available for classifying the degree of risk. The main ones include Rogers, Padua, and Khorana, with the Caprini risk assessment scale being frequently used (12). Risk assessment scales are commonly used to diagnose the disease. Such risk assessment scales can quickly and effectively identify a high-risk group from a large patient population, allowing for appropriate medical treatment to be implemented. VTE is one of the postoperative complications with high mortality and morbidity, it is also highly significant in major urological surgeries. Therefore, there is a need for current reviews and research articles on this topic to prevent VTE and emphasize the importance of evidence-based nursing care practices. This review was planned to highlight the role of prophylaxis in preventing VTE, one of the critical postoperative complications, and to emphasize nursing management.

Incidence of Venous Thromboembolism

VTE occurs in men and women at approximately equal rates, with an incidence of 160 per 100,000 across all age groups. VTE is responsible for about 10% of hospital deaths. A systematic review by Geerts et al. reported a VTE incidence of 13-31% without prophylaxis. Additionally, approximately 30% of VTE cases recur within 10 years (13). In a cohort study conducted by Logan et al. in 2023, it was reported that the incidence of VTE was 1.3%, with 0.7% occurring during hospitalization and 0.6% developing after discharge, and that 64.1% of patients with VTE were diagnosed with pulmonary embolism (PE). The same study found that among a total of 377 patients who died within 30 days after surgical procedures 1.3%, 5.7% were diagnosed with VTE, with 5 having deep vein thrombosis (DVT) and 17 having PE. Additionally, it was determined that the lowest incidence of VTE was in patients undergoing prostate 1.1% and kidney 0.9% procedures, while the highest incidence was in those undergoing bladder procedures 2.6% (4).

In the literature, the VTE risk for radical cystectomy ranges from 1.5% to 17.6% (14,15). Tikkinen et al. (16), reported a VTE incidence of 2.9-11.6% for open radical cystectomy and 2.6-10.3% for robotic radical cystectomy.

The study conducted by Naik et al. (2019), the incidence of VTE in patients undergoing radical prostatectomy is reported to be between 0.2% and 16.8%; for minimally invasive radical prostatectomy, it is 0.7%, and for robotic radical prostatectomy, it ranges from 0.2% to 0.9% (1). Additionally, for kidney procedures, the VTE incidence is between 0.7% and 11.6%. Specifically, for open partial nephrectomy, it is 1.0% to 3.9%; for robotic partial nephrectomy, it is 1.0% to 3.9%; and for laparoscopic partial nephrectomy, it is 1.1% to 4.2%. The VTE incidence for open radical nephrectomy is reported to be 1.1% to 4.4%, and for laparoscopic radical nephrectomy, it is 0.7% to 2.6%. It is noted that the majority of VTE cases occur after discharge, with the average time to VTE diagnosis being 14 to 20 days post-surgery (16).

Risk Factors

The most important factor for VTE is the reduction in venous return and the slowing of blood flow following prolonged immobilization (17). In cancer patients, the risk of VTE is significantly increased. It is shown that the highest rates of VTE occur in patients whose primary cancer originates in the pancreas, stomach, bladder, kidney, and hematological malignancies. Anemia, leukocytosis, thrombocytosis, and systemic therapies further increase the risk of VTE in cancer patients. The risk factors for thrombosis, such as hypercoagulability, hemodynamic stasis, and endothelial dysfunction (Virchow's triad), can persist for weeks following surgical intervention. General risk factors for VTE are listed in Table 2. (17).

Table 1. VTE Risk Model Based on Patient-Related Factors (9)

Risk Classification	Risk	Probability of VTE
Low Risk	Risk faktörü (-)	1x
Moderate Risk	Presence of at least one of the following risk factors: Age ≥ 75 BMI ≥ 35 VTE in first-degree relative (mother, father, sibling)	2x
High Risk	|History of VTE or presence of two or more risk factors	4x

Table 2. General Risk Factors for VTE (17)

Risk Factors	Description
Advanced Age	Increased age is associated with a higher risk of VTE.
Malignancy	Presence of cancer, especially pancreatic, gastric, bladder, kidney, and hematologic cancers.
Trauma	Physical injury that increases the risk of clot formation.
Immobility	Prolonged immobility slows blood flow, increasing the risk of clot formation.
History of DVT	Previous episodes of deep vein thrombosis.
Medications	Certain medications, such as hormone replacement therapy or oral contraceptives, increase VTE risk.
Surgical Procedures	Particularly major surgeries, which can cause endothelial damage and immobility.
Anemia	Lower than normal red blood cell count, associated with higher VTE risk in cancer patients.
Leukocytosis	Elevated white blood cell count, indicating inflammation, which can increase VTE risk.
Thrombocytosis	Elevated platelet count, contributing to a hypercoagulable state.
Systemic Therapies	Treatments such as chemotherapy, which can increase the risk of clot formation.
Endothelial Dysfunction	Damage to the inner lining of blood vessels, which can promote clot formation.
Hemodynamic Stasis	Reduced blood flow, often due to immobility or other factors, leading to clot formation.

Standard and Extended Thromboprophylaxis

Appropriate prophylaxis for VTE is the best way to reduce costs for both patients and healthcare institutions. A multicenter study by Lee et al. (2014) reported that only 67.5% of patients in medical intensive care settings received prophylactic treatment. The goal of VTE prophylaxis is to prevent VTE in high-risk patient groups before it occurs (18). A VTE risk assessment must be performed in the preoperative period (5). The American Heart Association states that, in addition to the VTE risks associated with major surgical procedures and underlying malignancy, additional factors such as previous VTE, age, obesity, immobility, and family history should also be taken into consideration (19). The treatment used to prevent VTE is called thromboprophylaxis, which can be applied through both mechanical and pharmacological methods. Pharmacological thromboprophylaxis agents include warfarin, standard heparin, low molecular weight heparin, and new oral anticoagulants. Mechanical prophylaxis can be used in addition to pharmacological prophylaxis or alone in patients with a low risk of VTE but a high risk of bleeding. The main mechanical methods used for VTE prophylaxis include early postoperative mobilization, foot and leg exercises, graduated compression stockings, and intermittent pneumatic compression devices. EAU and NICE guidelines reports that both mechanical compression and anticoagulation methods reduce the risk of postoperative DVT. Despite the guidelines published to prevent VTE, thromboprophylaxis is often inadequately or incorrectly applied (20). In the study by Logan et al. (2023), which examined venous thromboembolism chemoprophylaxis adherence rates after major cancer surgery, it was reported that the highest rates of chemoprophylaxis administration were observed in patients undergoing procedures in general surgery (10,102 out of 10,301 patients [98.1%]), while the lowest rates were in patients undergoing procedures in urology (11,471 out of 17,089 patients [67.1%]) (4).

The VTE risk for each patient should be assessed preoperatively (5). Pharmacological prophylaxis for VTE includes agents such as warfarin, standard heparin, low molecular weight heparin, and new oral anticoagulants. Mechanical prophylaxis can be used alone in patients with low VTE risk and high bleeding risk or in addition to pharmacological prophylaxis. Mechanical methods for VTE prophylaxis include early postoperative mobilization, foot and leg exercises, graduated compression stockings, and intermittent pneumatic compression devices (20).

According to the guidelines of the American College of Chest Physicians (ACCP) (2012), early mobilization and foot/leg exercises are recommended for surgical patients with a low risk of developing VTE (21). For patients in the moderate and high-risk groups, elastic bandages or mechanical compression devices are recommended to reduce venous stasis. These risk groups are presented in Table 3. This preventive measure taken before the occurrence of VTE is referred to as "primary prophylaxis." Primary prophylaxis is reported as the most effective way to prevent mortality in high-risk patient groups. Both mechanical and/or pharmacological methods can be used in VTE prophylaxis (22).

Table 3. Venous Thromboembolism (VTE) Risk Stratification in Surgical Patients (19)

Level of risk	Defining factors	Incidence of VTE, %		
		DVT	PE	Fatal PE
Low	Minor surgery in patients < 40 yr old without risk factors	2,5	0.2	0.002
Moderate	Minor surgery in patients with risk factors Minor surgery in patients 40–59 yr without risk factors Major surgery in patients < 40 yr or with risk factors	12–25	1-2	0.1–0.4
High	Minor surgery in patients > 60 yr Major surgery in patients > 40 yr or with risk factors	25–50	2-4	0.4–1.0
Highest	Major surgery in patients > 60 yr Major orthopedic surgery Spinal cord injury Trauma	50–70	4–10	0.2–5.0

DVT = deep vein thrombosis, PE = pulmonary embolism

Extended vs Standard-Duration Thromboprophylaxis (UTP vs STP) refers to the duration of preventive treatments used to reduce the risk of venous thromboembolism (VTE), including deep vein thrombosis and pulmonary embolism. Thromboprophylaxis is typically administered after surgical operations or in patients with a high risk of clotting to prevent blood clot formation (23).

Standard-Duration Thromboprophylaxis (STP): This refers to anticoagulant treatment administered for a fixed period based on a specific medical condition or surgical procedure. For example, short-term treatment may involve using low molecular weight heparin or similar blood-thinning medications for several days or weeks following surgery (23).

Extended-Duration Thromboprophylaxis (UTP): When the risk of clotting persists beyond the standard duration after surgery or illness, the treatment may need to be extended. Extended-duration thromboprophylaxis can last for months and is often applied to high-risk groups, such as cancer patients, those undergoing orthopedic surgery, or major urological surgery (23).

The choice between these two approaches depends on factors such as the patient's overall condition, clotting risk, type of surgery, and other considerations.

It has been proven that the risk of VTE after radical cystectomy is lower in patients using extended thromboprophylaxis compared to those using standard thromboprophylaxis. Studies comparing standard and extended thromboprophylaxis report that the incidence of VTE increases from 5.06% to 17.6% (90-day follow-up), from 2% to 6% (90-day follow-up), and from 11% to 23% (365-day follow-up) (1).

The study that is conducted by Kukreja et al. (2015), the VTE risk in patients undergoing open radical cystectomy versus robotic radical cystectomy was reported to be 8% with extended thromboprophylaxis versus 11% with standard thromboprophylaxis for open radical cystectomy, and 7% with extended thromboprophylaxis versus 22% with standard thromboprophylaxis for robotic radical cystectomy (24). In the cohort study conducted by Logan et al. (2023), it was reported that among hospitalized patients, the lowest thromboprophylaxis rates were observed in kidney (68.3%) and prostate (62.9%) procedures, while the highest rate was in bladder procedures (96.9%) (4). In a systematic review by Abdullah et al. (2022) evaluating the rate of venous thromboembolism (VTE) in bladder cancer patients based on treatment type, the overall VTE rate in these patients was reported to range between 1.9% and 4.7%, while it varied from 3% to 17.6% in patients undergoing cystectomy. The same study indicated that in patients receiving extended thromboprophylaxis, the VTE rate decreased from 17.6% to 5% (25).

In the cohort study conducted by Logan et al. (2023), it was reported that extended prophylaxis was administered

to 2.5% of patients undergoing kidney procedures, 37.6% of those undergoing bladder procedures, and 7.2% of those undergoing prostate procedures (4).

Prevention of VTE

The increased susceptibility to VTE in urological surgeries is primarily due to several factors: the pelvic location of the surgeries, the advanced age of most patients, the use of the lithotomy position for operations, and the relatively long period of postoperative immobilization. Mechanical prophylaxis does not increase the risk of bleeding, making it a favorable option. Chemical prophylaxis reduces the likelihood of VTE, but balancing the risk of bleeding with patient experience is not as straightforward as with mechanical prophylaxis (26).

Before the introduction of heparin prophylaxis, the incidence of DVT in pelvic surgery ranged between 10-30%. Although there are studies in the literature that include the use of aspirin, the evidence suggests that its effectiveness in reducing VTE events is insufficient. The American College of Chest Physicians (ACCP) and National Institute for Health and Care Excellence (NICE) guidelines recommend administering low molecular weight heparin for VTE prophylaxis via subcutaneous injection once daily. However, for patients with a body mass index (BMI) >40 kg/m², twice-daily injections are advised (27).

The most critical questions regarding VTE prophylaxis are when to start and when to stop it. Although the American College of Chest Physicians (ACCP) recommends initiating chemical prophylaxis preoperatively, guidelines suggest starting prophylaxis 4-6 hours before surgery to reduce the risk of bleeding (26).

In the literature, some studies implement chemical prophylaxis for a total of 28 days post-discharge, while others apply it for 28 days post-surgery(4, 25). In a study by Pariser et al. (2017), subcutaneous heparin was administered every 8 hours from before the induction of general anesthesia until discharge, followed by daily enoxaparin for 28 days postoperatively. This regimen reduced VTE incidence from 12% to 5%. Additionally, the overall finding of the study indicated that extended thromboprophylaxis reduced the likelihood of VTE by 77% (28).

For patients with conditions like heparin-induced thrombocytopenia, fondaparinux is reported as a well-tolerated alternative for urological oncology patients (29). Extended thromboprophylaxis is not only life-saving but also effective in reducing costs.

Morbidity and Bleeding

Anticoagulant medications are generally safe for use in patients undergoing surgical procedures, but the risk of bleeding is always a concern(4,25). According to Naik et al. (2019), bleeding events are classified based on severity, including those requiring transfusion, causing changes in management, necessitating re-intervention, being fatal, and leading to a decrease in hemoglobin of more than 2 g/dL (1).

In the literature, Phillips (2010) reported the risk of bleeding after radical prostatectomy to be 4% (30). Tikkinen et al. (2020) indicated that the bleeding risk in open radical prostatectomy varies between 0.1% and 0.2%, while this risk is reported to be 0.7%–1.4% in laparoscopic surgery and 0.4%–0.8% in robotic surgery (9). In the study by Wani et al. (2023), it was noted that anticoagulants like low molecular weight heparins reduce the relative risk of VTE by approximately 50%, but simultaneously, the administration of low molecular weight heparin increases the relative risk of major bleeding by about 50% (19).

There are no direct studies comparing bleeding risk between extended and standard thromboprophylaxis for radical prostatectomy in the literature. However, studies reporting absolute risk for bleeding are available. Phillips (2010) reported a post-radical prostatectomy bleeding risk of 4% (30). Additionally, in the study by Tikkinen et al. (2018), the bleeding risk for open radical prostatectomy ranged from 0.1% to 0.2%, while for laparoscopic surgery it was between 0.7% to 1.4%, and for robotic surgery it ranged from 0.4% to 0.8% (16).

These findings highlight the importance of balancing thromboprophylaxis to prevent VTE with the risk of bleeding complications in surgical patients, particularly in procedures like radical cystectomy and radical prostatectomy.

Studies examining post-nephrectomy bleeding risk are limited in the literature. According to Tikkinen et al. (2018), the risk of bleeding varies depending on the type of nephrectomy procedure:

For partial nephrectomy:

- ✓ Open surgery: 0.1%
- ✓ Laparoscopic surgery: 1.7%

- ✓ Robotic surgery: 0.5%

For radical nephrectomy:

- ✓ Open surgery: 0.05%
- ✓ Laparoscopic surgery: 0.5%
- ✓ Radical nephrectomy with thrombectomy: 2%

These findings indicate that differing bleeding risks associated with various surgical approaches in nephrectomy (16).

Mortality

It is emphasized that extended thromboprophylaxis after radical cystectomy does not lead to a statistically significant reduction in all-cause mortality (3% with standard thromboprophylaxis vs. 1% with extended thromboprophylaxis). Assessing all-cause mortality across urological surgical interventions, there is no significant difference in mortality between extended and standard thromboprophylaxis (1). In the study by Kukreja et al. (2015), overall mortality was reported as 17% with extended thromboprophylaxis and 24% with standard thromboprophylaxis (24).

Radical Cystectomy

The International Agency for Research on Cancer (IARC), known for its studies on assessing the global cancer burden, stated in its updated estimates in the GLOBOCAN 2020 report that bladder cancer is the 10th most commonly diagnosed cancer type worldwide. It is estimated that 573,000 new cases of bladder cancer could be diagnosed globally in 2020. Radical cystectomy remains the gold standard for patients with muscle-invasive bladder cancer; however, this surgical procedure can lead to various postoperative complications such as intestinal anastomotic leaks, wound infections, pneumonia, and venous thromboembolism (VTE) (29). VTE is a significant complication following radical cystectomy for bladder cancer, with an incidence reported in the literature ranging from 3% to 11%. Additionally, it contributes to substantial morbidity and mortality in the postoperative period (2,31). Considering the increased healthcare costs associated with VTE care, the seriousness of the issue is further underscored (32). Since more than 50% of VTE events occur after hospital discharge, the benefit of extended pharmacological prophylaxis following radical cystectomy becomes prominent (33,34). In the study by Cihang et al. (2020), it was reported that the implementation of a comprehensive VTE prophylaxis program as part of the ERAS protocol reduced VTE rates from 6.2% to 0.9% (35).

Radical Prostatectomy

With approximately 1.4 million new cases and 375,000 deaths, prostate cancer was the second most common cancer among men and the fifth leading cause of cancer-related deaths in 2020. Incidence rates are three times higher in developed countries compared to developing nations (37.5 per 100,000 versus 11.3 per 100,000), while mortality rates show less variation (8.1 per 100,000 versus 5.9 per 100,000, respectively). In about 60% of countries worldwide, prostate cancer is the most commonly diagnosed cancer in men. Prostate cancer ranks third globally among 185 countries with an estimated 1,276,106 new cases and eighth with 358,989 deaths annually (36). Each year, more than 75,000 radical prostatectomies are performed in the United States and over 7,000 in the United Kingdom, with the majority being performed robotically. Despite advancements in preoperative care for oncologic surgical interventions, surgical morbidity remains prevalent, with clinical venous thromboembolism (VTE) being the most commonly encountered cause of morbidity and mortality (37).

According to data from the American College of Surgeons National Surgical Quality Improvement Program (NSQIP), the 30-day readmission rate for patients undergoing radical prostatectomy is 4.1%, with VTE being the most frequent reason for readmission (accounting for 13.6% of readmissions). In addition, VTE leads to substantial cost increases for patients and the healthcare system. Patients with VTE experience higher rates of hospital readmissions (1.07% vs. 0.15%), emergency department visits (0.31% vs. 0.05%), and overall costs ($28,353 vs. $17,712) compared to those without VTE (38). Therefore, improving patient care and management during the perioperative period is crucial for reducing the incidence of VTE.

The literature reveals that the risk of venous thromboembolism (VTE) in patients undergoing radical prostatectomy surgery varies based on factors such as lymph node dissection and surgical approach (19). According to Eifler et al. (2011), in a study involving 773 patients who underwent laparoscopic radical prostatectomy with a 90-day follow-up period, simultaneous pelvic lymph node dissection was performed in 468 patients (60.8%) (39). Among these patients, VTE occurred in 1.5% of cases, while no VTE cases were observed in patients who did not undergo pelvic lymph node dissection. Similarly, another study analyzed 3,544 patients, of whom 547 (15.4%) underwent pelvic lymph node dissection. It reported that these patients faced an 8-fold higher risk of deep vein

thrombosis and a 6-fold higher risk of pulmonary embolism compared to those who did not undergo pelvic lymph node dissection. Furthermore, among patients who did not undergo pelvic lymph node dissection, those who underwent open radical prostatectomy were reported to have an increased risk of VTE compared to those who underwent robotic radical prostatectomy (40).

Tikkinen et al. (2018) also highlighted that patients undergoing open radical prostatectomy face a 2-4 times higher risk of VTE compared to those undergoing laparoscopic or robotic radical prostatectomy. They emphasized a direct correlation between the prevalence of pelvic lymph node dissection and the risk of VTE (16).

These findings underscore the significant impact of surgical factors, such as lymph node dissection and surgical approach, on the incidence of VTE following radical prostatectomy. Identifying and mitigating these risks through appropriate prophylactic measures are crucial in managing postoperative complications effectively.

Radical and Partial Nephrectomy

Renal cell carcinomas (RCC) account for approximately 3% of all cancers and are more common in Western countries. The countries with the highest incidence of RCC in the world are the Czech Republic and Lithuania. Over the past twenty years, there has been a 2% increase globally. In developed regions such as North America, Europe, and Australia, the incidence of RCC has risen more sharply compared to other parts of the world. RCC is the most common solid lesion in the kidney, comprising about 90% of all renal malignancies. RCC is 1.5 times more common in men and typically affects individuals between the ages of 55 and 75, with various histopathological and genetic subtypes. Venous thromboembolism (VTE) can also occur after kidney surgery. VTE incidence is 0.4% following nephrectomies performed for benign reasons, while it rises to 2% after nephrectomies for malignancy (41). In a study by Pettus et al. (1989-2005) involving 2,208 patients who underwent radical or partial nephrectomy, the incidence of VTE was reported as 1.5% during the period without prophylaxis, and 0.6-0.9% during the period with prophylaxis. Therefore, routine prophylaxis is recommended for patients who are undergoing radical or partial nephrectomy today (41).

Evidence-Based Nursing Practices in Preventing VTE

Radical Cystectomy

Radical cystectomy is classified as major surgery, with a high risk of postoperative bleeding and thrombosis. Due to its classification as major surgery, it poses risk factors for venous thromboembolism (VTE) (3). Furthermore, patients who develop VTE post-surgery contribute to increased healthcare costs due to the burden of care, loss of workforce, and prolonged hospital stays (9). Therefore, it is crucial to implement and monitor necessary precautions for VTE. Studies show that that the incidence of VTE ranges from 3% to 11%, with the majority of these cases developing after patients are discharged from the hospital (42). In a prospective study conducted by Clement et al., the effects of early ambulation, leg compression, and 15 days of low molecular weight heparin use on the development of postoperative deep vein thrombosis (DVT) were evaluated in 583 patients undergoing urological cancer surgery (29). Doppler ultrasound was performed on patients on the 7th postoperative day, revealing DVT and pulmonary embolism (PE) rates of 7.4% and 2.2%, respectively. Multivariable analysis identified renal surgery as a risk factor for the development of DVT and PE (43). Venous thromboembolism (VTE) is a complication that can be prevented through nursing interventions, emphasizing the necessity of evidence-based practices. The following evidence is presented:

- It is recommended to establish an institution-specific protocol that includes early mobilization, pharmacological thromboprophylaxis, and mechanical thromboprophylaxis for the prevention of VTE (Evidence Level IB) (44).
- In patients at moderate to high risk of surgical complications, routine use of simple compression stockings without pharmacological thromboprophylaxis is not recommended for VTE prevention (Evidence Level IB) (44).
- For patients contraindicated for pharmacological thromboprophylaxis, mechanical prophylaxis, such as intermittent pneumatic compression devices or simple compression stockings, is recommended. The use of intermittent pneumatic compression devices is preferred over simple compression stockings (Evidence Level IB, 2B) (44).
- In patients at low risk and contraindicated for pharmacological thromboprophylaxis, prophylaxis with

only simple compression stockings is not recommended (Evidence Level 2C).

- In patients with a very high risk of VTE undergoing pharmacological thromboprophylaxis, routine use of mechanical thromboprophylaxis (such as simple compression stockings or intermittent pneumatic compression devices) is not recommended (Evidence Level IB) (44).
- In patients with a very high risk of surgical complications related to VTE, the combined use of mechanical and pharmacological prophylaxis is recommended. In patients at high risk of VTE, intermittent pneumatic compression devices are preferred in addition to pharmacological thromboprophylaxis over simple compression stockings (Evidence Level 2B) (45).

Radical Prostatectomy

The risk of venous thromboembolism (VTE) is high following radical prostatectomy, and evidence-based nursing practices play a crucial role in mitigating this risk. Current studies confirm that early mobilization is effective in reducing the incidence of VTE. Additionally, compression stockings and intermittent pneumatic compression devices, monitored by nurses, are frequently utilized to prevent VTE (19). Pharmacological prophylaxis, particularly with low molecular weight heparin, is implemented to further decrease the risk of VTE (46). Nurses' patient education and postoperative follow-up care are critical components in the prevention of VTE after surgery (46). Therefore, the use of preventive evidence-based practices is essential. These practices include:

- Early mobilization of patients after surgery is one of the most effective methods to reduce the incidence of VTE. Mobilization increases blood flow, thereby preventing thrombus formation (Evidence Level IA) (46).
- The use of anti-embolic stockings helps prevent thrombus formation by enhancing venous blood flow in the lower extremities. It is essential to ensure that these stockings are applied correctly and that their usage duration is appropriately monitored (Evidence Level IB) (47).
- Informing patients about the risk of VTE, its symptoms, and the importance of prophylactic treatments can help prevent complications. Patient education plays a critical role in reducing VTE risk, especially in the postoperative period (Evidence Level II) (47).

Radical and Partial Nephrectomy

The risk of venous thromboembolism (VTE) is quite high in patients undergoing radical and partial nephrectomy, making evidence-based nursing practices critically important. It has been proven that early mobilization significantly reduces the risk of VTE in this patient population. Additionally, compression stockings and intermittent pneumatic compression devices used under the supervision of nurses play a vital role in preventing VTE. Pharmacological prophylaxis, particularly with the support of low molecular weight heparin, further reduces the risk of VTE. Nurses' patient education and postoperative follow-up are essential components in preventing VTE after surgery (48). In this context, implementing evidence-based practices is crucial for preventing VTE, reducing healthcare costs, and improving patients' quality of life post-surgery (49). These evidence-based practices include:

- Early mobilization increases blood flow after surgery, thereby reducing the risk of VTE. Nurses facilitate patients' movement shortly after surgery and monitor this process (Evidence Level IA) (50).
- The use of anti-embolic stockings enhances venous blood flow in the lower extremities, preventing thrombus formation. It is essential to ensure that these stockings are applied correctly and that their duration of use is appropriately monitored (Evidence Level IB) (50).
- Intermittent pneumatic compression (IPC) devices apply mechanical pressure to the lower extremities, accelerating venous circulation and preventing thrombus formation. Nurses guide patients on the use and effectiveness of these devices (Evidence Level IA) (50).
- Low molecular weight heparin (LMWH) is a commonly used anticoagulant to prevent VTE in patients following nephrectomy. Nurses take responsibility for the correct timing and dosage of the medication, ensuring the patient's adherence to treatment (Evidence Level IA) (50).
- Nurses educate patients about the symptoms of VTE, risk factors, and prophylactic measures, thus supporting risk management. Post-discharge follow-up is a critical measure in monitoring and controlling the development of VTE (Evidence Level IIA) (50).

One of the simplest ways to prevent VTE is through thorough preoperative assessment and a complete medical history for every patient undergoing surgery. Effective healthcare and

reliable nursing anamnesis, starting from the patient's initial contact with the nurse upon admission to the surgical clinic, can prevent complications. By obtaining a comprehensive and accurate medical history, VTE risk can be assessed, and necessary pharmacological and/or mechanical preventive measures can be implemented. Using a specific risk assessment tool is crucial as it creates a common language in nursing care and management. During the nursing diagnosis process, assessing risks and taking patient-specific preventive measures based on a risk scale is vital for VTE prevention.

CONCLUSION

To conclude, it is crucial to develop institution-specific protocols integrating early mobilization, pharmacological thromboprophylaxis, and mechanical thromboprophylaxis for preventing DVT in patients undergoing major urological surgical procedures, as outlined in the literature. Achieving collaboration through a multidisciplinary team approach is essential. Nurses who are integral parts of this team and pivotal in patient care, should be actively involved. In surgical clinics, emphasizing the importance of early ambulation during in-service training, ensuring standardization of ambulation practices, and utilizing evidence-based approaches with checklists for VTE prevention are all significantly important.

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