Venous Thromboembolism in Patients With Cancer Part I

Survey of Oncology Nurses’ Attitudes and Treatment Practices for Ambulatory Settings

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Venous thromboembolism (VTE) is a complication in patients with cancer. VTE has been implicated as a harbinger of the disease in patients not yet diagnosed with cancer and is associated with a poorer prognosis in patients with an existing neoplasm diagnosis (Kakkar, Levine, Pinedo, Wolff, & Wong, 2003; Sutherland, Weitz, & Liebman, 2003). Patients with cancer are at higher risk for VTE for a variety of reasons, and clinicians, including oncology nurses, should be aware of the individual risk factors for this patient population.

Treatment of VTE for patients with cancer may involve a sequential combination of unfractionated or low-molecular-weight heparin (LMWH) followed by oral warfarin therapy or LMWH for continued anticoagulation. The goal of this treatment is to prevent propagation of the clot as well as protect against future embolic events. Although appropriate anticoagulation treatment may be given to patients with cancer, optimum treatment outcome may not occur. Reasons for inadequate anticoagulant response of patients with cancer include the possibility of Trousseau syndrome (first described in 1865), a recurrent thromboembolic state which may occur in a variety of sites, including veins not usually associated with VTE, such as the portal vein or axillary thrombosis (Callander & Rapaport, 1993).

Patients with cancer have a higher incidence of venous thromboembolism (VTE). Little information currently exists on VTE and the understanding and beliefs of oncology nurses. Therefore, the attitudes and treatment practices of ambulatory oncology nurses were surveyed to determine the current knowledge base of VTE in patients with cancer. Survey results are presented along with a thorough literature review of thromboembolism and the unique risk factors for this frequent complication in patients with cancer. The causes of VTE in this patient population often are multifactorial and include hypercoagulability, stasis, and vascular endothelial damage from procedures or the neoplastic process itself. In particular, chemotherapy administration can increase the risk of thrombosis considerably. New therapies, including thalidomide, require oncology nurses caring for these patients to have heightened awareness of the potential for thrombogenic complications. This is the first of two articles that address the problem of thromboembolism in patients with cancer, including the survey results. (See part II on page 465.) Oncology nurses are essential in the care of VTE in patients with cancer and can help with patient identification, treatment, and compliance for improved patient outcomes.

Key Words: thromboembolism, heparin, blood coagulation

Epidemiology

As many as 15% of patients with cancer may present with clinically significant thromboembolic events; some researchers report the incidence as 1%–
10% (Rickles & Levine, 2001). Patients with cancer at autopsy have been noted to have a venous thrombosis rate of 50%; however, the clinical significance of this finding is not known (Sutherland et al., 2003). Thromboembolic events have been known to precede the diagnosis of cancer in some patients, leading researchers to question whether patients should receive a full workup for the detection of a neoplasm upon diagnosis of idiopathic VTE (Carman & Fernandez, 1999).

Although the general diagnosis of cancer places these patients at higher risk for thrombosis, the specific type of cancer diagnosis plays an important role in the development of a thrombotic event. Studies have implicated individuals with pancreatic, brain, prostate, gastric, and lung cancers as having an increased risk for VTE; in women, a diagnosis of ovarian or colorectal cancer can place an individual at higher risk (Kakkar et al., 2003; Sutherland et al., 2003). Newly diagnosed patients with cancer with VTE, and those who developed VTE within one year of a new cancer diagnosis, were found to have an advanced stage of cancer and poor prognosis (Sorensten, Mellemkjaer, Olsen, & Baron, 2000; Taliani et al., 2003). Nurses who care for patients with cancer should recognize the increased risk and current treatment strategies for VTE in this patient population.

Oncology Nurses’ Attitudes and Treatment Practices for Venous Thrombosis in Outpatient Settings

The 25-question survey was sent to 3,916 outpatient oncology nurses in the ONS database via e-mail in September 2003 using Zoomerang® software (MarketTools®, Inc., Mill Valley, CA). Outpatient oncology nurses who did not have e-mail did not receive the survey. The survey, developed by Oncology Education Services, Inc., and Pharmion Pharmaceuticals, was a pilot survey to determine the attitudes toward, knowledge of, and treatment practices for VTE in outpatient settings.

Although oncologists recently were surveyed regarding their knowledge and treatment practices for patients with VTE and cancer, to the authors’ knowledge, this is the first time that ambulatory oncology nurses have been surveyed about VTE in patients with cancer. A total of 567 nurses (14.5%) responded to the survey.

Demographics

Thirty-four percent of the respondents work in outpatient or ambulatory care areas, with 32% in individual physician practices. Forty percent indicated their setting as a combination of inpatient and other types of settings. Half of the respondents are direct patient caregivers, with 26% working as advanced practice nurses. Educational background information was not elicited from the respondents. Ten percent of the nurses were managers, and another 10% indicated that they were educators. The most common cancers treated in the individuals’ practice settings were lung (67%), breast (66%), and colorectal (50%).

Significance of Venous Thromboembolism in Patients With Cancer

The nurses reported a range of 0–40 patients treated for deep vein thrombosis (DVT) or pulmonary embolism (PE) in their settings, with a mean of 4.5 a month. Respondents were asked to rate whether DVT with or without PE is a common and often-serious problem in patients with cancer, and 92% either agreed or strongly agreed that DVT can be symptomatic or asymptomatic in patients with cancer. Thirty-nine percent believed that DVT with subsequent PE was a frequently suspected cause of death for patients with cancer, although 34% were neutral and 16% disagreed.

With regard to whether patients with cancer undergoing abdominal or pelvic surgery had an increased risk of DVT or PE, most of the respondents (87%) strongly agreed or agreed that these patients had an increased risk of DVT or PE. When asked whether the occurrence of DVT or PE in patients with cancer can lead to a poorer prognosis, 65% of the nurses agreed with the statement, although 22% were neutral and 13% disagreed. The outpatient oncology nurses were queried as to whether DVT or PE is under- treated or undertreated. Although 35% agreed and 12% strongly agreed, many of the nurses believed that DVT or PE was not an underdiagnosed or undertreated problem for their patients with cancer (see Figure 1).

In the Frontline survey of oncologists regarding thrombosis and patients with cancer, the respondents were asked to rate their perceptions of risks of VTE by tumor type and identified brain, pancreatic, colorectal, ovarian, prostate, cervical, esophageal, and gastric cancers (Kakkar et al., 2003). Although outpatient oncology nurses were not asked to individually rate tumor risks by type, 87% strongly agreed or agreed that certain tumor types and stages were more likely to be associated with DVT or PE.

One question asked about the relationship between chemotherapy agents and regimens and development of DVT or PE in patients with cancer. Although the nurses were not asked to describe individual drugs that increased risk, the connection between certain drugs and regimens more frequently associated with DVT or PE for patients with cancer was recognized as important by 74% of the respondents; 20% were neutral on the subject, and 6% disagreed completely.

Contributing Factors to Thrombosis in Patients With Cancer

Virchow’s triad describes the three factors associated with the development of VTE: stasis, hypercoagulability, and vascular endothelial damage (see Figure 2) (Carman & Fernandez, 1999; Ginsberg, Merli, & Young, 1998). Patients with cancer are uniquely predisposed to the development of these factors.

Stasis

Patients with cancer often are at risk for stasis because of their disease or complications...
of disease treatments. Fatigue associated with anemia, cancer treatments, and neoplastic disease itself can cause patients to remain sedentary for long periods of time, thus increasing their risk for VTE. Hospitalization and immobilization also have been implicated in the development of VTE for patients without cancer; patients with cancer may be subject to both of these (Carman & Fernandez, 1999). In addition, patients with cancer who receive major surgery are at significant risk for VTE; one report described these patients as twice as likely to have thrombotic complications postoperatively and three times more likely to die from pulmonary embolism as patients without a cancer diagnosis (Sutherland et al., 2003).

Hypercoagulability

Tumor-initiated: Malignant disease promotes a thrombophlic state in patients with cancer, disrupting the normal coagulation system (Deitcher, 2003; Gouin-Thibault, Ashkar, & Samama, 2001) (see Figure 3). More than 90% of patients with metastatic cancer and approximately half of all patients with cancer have abnormal coagulation parameters (Goad & Gralnick, 1996). Tumor cells are able to express and secrete pro-coagulants (cancer procoagulant and tissue factor) that contribute to the hypercoagulability state in patients with cancer (Gouin-Thibault et al.; Prandoni, Piccioli, & Girolami, 1999). These prothrombotic factors may play a significant role in the development of VTE for patients with cancer (Lip, Chin, & Blann, 2002). Expression of tissue factor, which normally is produced by monocytes and the endothelium, can be upregulated because of vascular endothelial growth factor and may have a role in activation of blood coagulation as well as tumor growth and dissemination (Lip et al.). Cancer procoagulant, a cysteine proteinase growth factor, is an activator of factor X and may increase the generation of thrombin significantly in the presence of factor V, contributing to a thrombotic event (Kwaan, Parmar, & Wang, 2003; Lip et al.). Thrombin, integral to the formation of a normal clot, is generated by the release of procoagulant from tumor cells and activation of the coagulation process (Kwaan et al.). Tumor cells develop increased adhesiveness to platelets, contributing to the activation of platelets with the presence of thrombin (Kwaan et al.).

Tissue factor pathway inhibitor (TFPI) levels may be increased in patients with cancer, including patients with colon and pancreatic cancer, and TFPI is produced mainly by the vascular endothelial cells in the tumor (Kwaan et al., 2003). TFPI’s normal role is to provide an inhibitory effect on thrombosis (Kwaan et al.). For patients with cancer, this inhibitory role is thought to be less effective when apoptosis and tissue factor are increased (Kwaan et al.).

Neoplastic cells can promote activation of a patient’s clotting system, generating thrombin that can lead to a thromboembolic event. Tumor cells can cause aggregation of platelets in patients with cancer, with the increased platelet reactivity contributing to hypercoagulability (Callander & Rapaport, 1993; Lip et al., 2002). In addition, the number of platelets and turnover time are increased for many patients with cancer (Lip et al.).

For hereditary prothrombotic disorders affecting antithrombin III, proteins C or S can affect the coagulable state in patients with cancer; proteins S and C are vitamin K-dependent proteins produced in the liver (Goad & Gralnick, 1996). Proteins S and C are the body’s natural anticoagulant system (Anderson & Spencer, 2003). Deficiencies of these proteins can predispose patients to the development of VTE (Viale, 1999).

Effect of Chemotherapy

The hypercoagulable state also is affected by the antineoplastic therapies given to patients with cancer. Nurses responding to the survey correctly agreed or strongly agreed (74%) that certain chemotherapy drugs and regimens are more frequently associated with VTE in patients with cancer. The literature reports increased risk of thrombosis with patients treated with platinum agents, 5-fluorouracil (5-FU), mitomycin, tamoxifen, growth factors, and, most recently, thalidomide (Kuzel, Esparaz, Green, & Kies, 1990; Mehta, 2003).

A study of 159 patients with metastatic breast cancer showed a VTE rate of 17.5% when receiving cyclophosphamide, methotrexate, and 5-FU (CMF) plus vincristine and prednisone (Goodnough, Saito, Manni, Jones, & Pearson, 1984). Tamoxifen long has been implicated in increasing thrombotic risk for patients with breast cancer, although the mechanism of action for this is not known (Bick, 2003). Increased thromboembolic events were reported in one study of patients with breast cancer receiving concurrent tamoxifen and chemotherapy, compared to women receiving tamoxifen alone (Pritchard et al., 1996). Forty-eight thromboembolic events occurred in 353 women (13.6%), and the events were rated more severe (Pritchard et al.). One report proposed that patients with inherited Factor V Leiden (causing activated protein C resistance) need to be evaluated carefully if receiving tamoxifen because the risk of thrombosis was found to be significantly increased for those patients (Weitz, Israel, & Liebman, 1997). Coagulation studies in a small group of women receiving CMF showed decreased levels of proteins C and S, which could promote a thrombogenic event (Rogers, Murgo, Fontana, & Raich, 1988).

Thalidomide is associated with a higher risk of thrombosis when used as a single agent; adding other chemotherapy agents increases its thrombogenic effect (Mehta, 2003). An article described a high rate of VTE for patients receiving weekly IV gemcitabine with continuous-infusion 5-FU and thalidomide (Desai et al., 2002). Twenty-one patients with metastatic renal cell carcinoma were found to have a 43% rate of VTE, and because the patients did not show an objective improved response rate, the authors concluded that the regimen should not be used because of this toxicity (Desai et al.).

Thalidomide also was cited as increasing thrombotic risk for patients receiving dexamethasone plus doxorubicin and thalidomide plus dexamethasone (Desai et al., 2002; Mehta, 2003; Rajkumar et al., 2002; Zangari et al., 2002). The addition of dexamethasone was shown to cause thrombosis.
in one study of 40 patients with multiple myeloma (Weber, Rankin, Gavino, Delasalle, & Alexanian, 2003). To prevent thrombotic complications, the first 24 patients treated with the combination received warfarin 1 mg by mouth every day; however, a significant 25% incidence of thrombotic or embolic events was noted (Weber et al.). Once the patients received therapeutic doses of warfarin, they had no more thrombotic events. In one group of patients with multiple myeloma receiving dexamethasone, vincristine, doxorubicin, cyclophosphamide, etoposide, and cisplatin with thalidomide, the VTE rate was 28% (14 out of 50 patients) compared to 4% (2 out of 50 patients) not receiving the additional agent (Zangari et al., 2001).

One European trial described a high incidence of VTE (three out of seven patients, or 43%) in patients with myelodysplasia receiving thalidomide with darbepoetin alfa; the researchers recommended prophylactic anticoagulation and careful surveillance for patients receiving the combination treatment (Steurer, Sudmeier, Stauder, & Gastl, 2003). Thrombosis has been noted as a possible side effect for darbepoetin alfa and erythropoetin growth factor, as well as granulocyte–colony-stimulating factor and granulocyte–monocyte–colony-stimulating factor (Bick, 2003; Steurer et al.).

Patients with multiple myeloma were found to have an increased arterial thrombosis rate (2 out of 23 patients) as well as an increase in the incidence of venous thromboembolic events (5 out of 23 patients) in another study of patients on thalidomide (Bowcock, Rassam, Ward, Turner, & Laffan, 2002). An increased VTE rate was found in patients with prostate cancer with metastatic androgen-independent disease receiving docetaxel and thalidomide (Horne et al., 2003). In a retrospective analysis of a randomized phase II trial, 9 out of 47 (19%) patients on docetaxel plus thalidomide developed VTE, compared to none of the 23 patients on docetaxel alone, leaving the researchers to conclude that caution should be heightened for patients on the combination regimen (Horne et al.).

**Vascular Endothelial Damage**

Although tumor cells themselves may cause disruption of vascular wall integrity, trauma can occur from invasive procedures, including central line placement, performed on patients with cancer. Placement of central venous catheters occurs commonly for patients receiving chemotherapy to facilitate drug delivery. However, these catheters also can increase risk for development of VTE (Bona, 2003; Lee & Levine, 2003; Verso & Agnelli, 2003).

Although the incidence is not well defined, some articles report incidence rates from 2%–40% (Bona, 2003; Lee & Levine, 2003). Adding low-dose or “minidose” warfarin to prevent VTE has been controversial for patients with cancer and central catheters; not all clinicians prescribe prophylactic warfarin to their patients (Carr & Rabinowitz, 2000; Heaton, Han, & Inder, 2002). However, because many patients with cancer receive central catheter devices, exploring prophylaxis of these patients with oral anticoagulation to prevent upper-extremity VTE may be prudent (Bona, 1999; Monreal & Davant, 2001). In a group of 121 patients (82 of whom completed the study) with indwelling central venous catheters, researchers randomized two groups to receive either 1 mg of warfarin or no treatment (Bern et al., 1990). Of the patients not receiving oral warfarin, 15 had thrombosis confirmed by venogram compared to the 42 patients in the warfarin arm who experienced four confirmed VTEs (Bern et al.). Monreal et al. (1996) also explored the use of LMWH for patients with cancer with central catheters and found that the group receiving LMWH had a decreased risk of VTE on the drug. A British study found that minidose warfarin was effective in reducing line-associated thrombosis in 108 consecutive patients with hematologic malignancies compared to a historic group of 115 consecutive patients (Boraks et al., 1998). The warfarin group had a 5% thrombosis rate compared to the anticoagulant-free group’s thrombosis rate of 13%, leading the researchers to conclude that warfarin significantly reduced the thrombosis rate in this particular group of patients (Boraks et al.).

A retrospective review of 160 consecutive patients with metastatic melanoma or renal cell carcinoma was conducted to determine the incidence of central catheter bloodstream infection and thrombosis while receiving moderate-dose, continuous-infusion interleukin-2 (Eastman et al., 2001). All of the patients had implanted central catheters (mostly tunnelled catheters), and 84 patients received 1 mg warfarin daily to prevent thrombosis. Twenty-six patients (16%) developed central catheter thrombosis despite the addition of low-dose warfarin on this regimen, although the type of chemotherapy given also may have affected results. Researchers in New Zealand studied the use of minidose warfarin as prophylaxis for central venous catheter thrombosis in patients with hematologic malignancies and also found that no benefit existed with oral anticoagulants in their patient population (Heaton et al., 2002).

A prospective, randomized trial was performed comparing the efficacy and safety of low-dose warfarin and LMWH (nadroparin) in patients with cancer who had central venous catheters placed (Mismetti et al., 2003). Treatment was continued for 90 days or until upper-extremity thrombosis occurred. A total of 59 patients participated in the study; 28.6% (6 of 21 patients) of the LMWH group developed thrombosis compared to 16.7% (4 of 26 patients) in the low-dose warfarin group. The researchers concluded that the two treatments had comparable benefit-to-risk ratios and that these treatments were safe for this group of patients (Mismetti et al.).

Researchers looked at the use of minidose warfarin in prophylaxis of patients with cancer with central lines receiving continuous-infusion 5-FU–based chemotherapy, (42% de Gramont regimen, 22% de Gramont with oxaliplatin, 20% de Gramont with irinotecan, and 18% other chemotherapies in combination with infusional 5-FU) (Masci et al., 2003). Although the investigators noted that low-dose warfarin has been effective in reducing thrombosis for patients with cancer with central catheters, concern existed for possible drug-drug interactions. The results did show a high incidence of international normalized ratio abnormalities in these patients; patients on de Gramont with oxaliplatin particularly were affected. The results prompted the researchers to call for regular monitoring of prothrombin time for patients on warfarin and 5-FU (Masci et al.).

Because many patients with cancer receive central lines and chemotherapy treatments for their disease, oncology nurses should increase their awareness of the risk factors associated with treatment, including thromboembolic events. Although controversial, low-dose warfarin has been used as prophylaxis in some patients with cancer who have central access devices. Neoplastic disease also increases the thrombotic risk for patients; many of these patients are at risk for stasis and the development of thrombosis resulting from fatigue and other conditions associated with treatment.

**Diagnosing Venous Thromboembolism in Patients With Cancer**

Most (94%) of the respondents reported using a Doppler or ultrasound examination to diagnose VTE in their practice settings; 10% indicated a venogram as the tool used most often. Although 70% of respondents
described the person making the initial diagnosis as the oncologist or hematologist in most practice settings. 21% believed that nurses were instrumental in the diagnosis of VTE, and an additional 19% reported the nurse practitioner in their setting as the initial contact for diagnosis. Clearly, the respondents believed that nursing had an active role in helping to make the initial diagnosis of VTE in their individual practice settings.

Oncology nurses should recognize the signs and symptoms of VTE for patients with cancer and respond appropriately for optimal patient outcome. Risk factors for VTE include immobility, malignancy and treatment for malignancy, recent major surgery, increasing age, trauma, a history of prior VTE, and chronic heart failure (Anderson & Spencer, 2003).

Patients with VTE may present with unilateral swelling in one limb, and warmth or erythema may be present (see Figures 4 and 5). Some patients will complain of pain in the extremity; others may not be aware of any discomfort. As many as 50% of patients will present with clinically “silent” VTE and may not report any symptoms at all (Morris, 2004).

Patients should be evaluated for symptoms of chest pain or shortness of breath because this could be a sign of PE (Viale, 1999). Thrombosis of the calf veins can propagate in 13%–32% of cases; if propagation occurs, a higher risk of PE exists (Carman & Fernandez, 1999).

If VTE is suspected, a radiographic study should be performed. Initial examination usually involves a Doppler compression ultrasonography (or duplex scanning) that can evaluate the venous system (see Figure 6) (Ginsberg et al., 1998). The advantage of this examination is that it is noninvasive; however, the gold standard is still the venogram. If the Doppler is negative and the clinician still is suspicious of the presence of VTE, a venogram should be performed to rule out thrombosis (Ginsberg et al.).

Initial laboratory tests should include complete blood count, baseline prothrombin time, adjusted partial thromboplastin time, and international normalized ratio (Ginsberg et al., 1998). Some clinicians also will order a plasma D-dimer test, which is elevated in confirmed VTE.

Management of Venous Thromboembolism in Patients With Cancer

Of particular interest, when asked if a protocol existed for DVT, more than half of the nurses did not have one in their institutions to help standardize their treatment of DVT (58%), although 42% did report existing protocols. One respondent commented, “I would like a standard protocol for treating DVT. We have so many physicians and each has his/her own way of treating. . . . There seems to be no consistency.” Even though 39% of the respondents reported that DVT is not treated until the condition is confirmed, most reported that prophylactic treatment indeed is practiced in their treatment settings. The method of prophylaxis differs, however, because 35% stated that warfarin is the standard treatment, whereas 31% used enoxaparin (Lovenox®, Aventis Pharmaceuticals, Bridgewater, NJ), 15% used LMWH, and 4% used dalteparin (Fragmin®, Pharmacia Cor-

Nursing Issues

The outpatient oncology nurses were asked about the education tools used for their patients diagnosed with VTE. Recognizing the importance of patient education in the optimal treatment of patients with cancer with VTE, respondents indicated that brochures and pamphlets were the most common tool used to provide information to patients (65%). Patient starter kits were used by 18% of the nurses, and another 12% showed videos to teach patients. Nurses were asked whether their clinical settings used home health care in the treatment of patients with VTE, but few settings reported using home health care to treat their patients: 22% reported no home healthcare intervention, and 53% stated that home health care was used in less than 20% of their patients. When asked about the percentage of patients treated exclusively as outpatients, the nurses reported that not all patients are treated as outpatients, and barriers to successful outpatient treatment were delineated as well (see Figure 7).

Respondents were asked to define areas where additional nursing education is needed; almost half described risk factor (49%) and VTE prevention (55%) information as important, with 49% specifying necessary treatment information. The majority of the respondents (55%) believed that the best way to get this information is with online content devoid of interaction. Several respondents...
indicated that patients in neuro-oncology have different risk factors for DVT and that “a high rate exists” with GBM [glioblastoma multiforme] patients. Initial teaching [for these patients] always includes information on prevention and signs and symptoms [for DVT].” One nurse said that “there needs to be a segment of education that teaches nurses and doctors to be aware of . . . heparin-induced thrombocytopenia and bleeding.”

Implications for Oncology Nurses

Nurses working with patients with cancer should be aware of the factors that increase their patients’ risk for development of VTE, including the chemotherapy treatments that can promote thrombogenicity. Patients with cancer are exposed to increasingly complex regimens containing agents that can multiply their risk factors for developing a thrombus. Patients on thalidomide should be monitored carefully so that signs or symptoms of a thrombus can be detected; other chemotherapy agents and common supportive care drugs such as growth factors are implicated as well. Nurses should ask about patients’ history of activity, use of oral contraceptives, infection, insect bites, trauma, and cigarette smoking. Physical assessment of patients with cancer includes monitoring for unilateral swelling of a limb, erythema or warmth, or possible cord formation (Crowther & McCourt, 2004; Viale, 1999). Obtaining an accurate patient history of the sequence and duration of symptoms and determining whether chest pain or shortness of breath is present (possible signs of pulmonary embolism) are important.

Conclusion

Oncology nurses responding to the survey validated their knowledge regarding the significance of VTE and patients with cancer who they treat. Areas of needed education were identified, including the preferred method of instruction for this group. Although some respondents did not agree that specific chemotherapy agents and treatments increase VTE risk for patients with cancer or that these patients have a poorer prognosis, most of the nurses did agree that these patients are uniquely predisposed by disease and therapy to develop a thrombus. Establishment of protocols or clinical pathways to help define VTE management was also an area that the respondents identified as important. Additional research on the attitudes and practices of other specialty nurses, including oncology nurses, would be helpful to better determine appropriate protocols and need for educational programs.

Patients with cancer are subject to many conditions that increase their risk for VTE. VTE’s triad refers to stasis, hypercoagulability, and vascular endothelial damage in the promotion of a thrombus. Cancer, as a disease, causes alterations in coagulation that may predispose patients to VTE. Neoplastic cells and invasive procedures, such as placement of indwelling catheters, also may contribute to the development of a thrombus. Certain chemotherapy agents are known to increase the thrombogenic risk in patients with cancer; this risk is noted particularly with the increased use of thalidomide as a treatment option for multiple myeloma and other cancers, requiring heightened awareness for oncology nurses working with patients with these diseases.

Initial treatment of VTE involves anticoagulation therapy; the types of anticoagulant therapy are varied and may depend on many different factors. Oncology nurses need to recognize the signs and symptoms of VTE because they may be the first clinicians patients encounter during clinic visits. VTE is a significant complication in patients with cancer.

References


**Rapid Recap**

**Venous Thromboembolism in Patients With Cancer Part I**

**Survey of Oncology Nurses’ Attitudes and Treatment Practices for Ambulatory Settings**

- Venous thromboembolism (VTE) is a frequent complication for patients with cancer.
- Virchow’s triad refers to three conditions that may predispose patients with cancer to the development of VTE: stasis, hypercoagulability, and vascular endothelial damage.
- Treatment for VTE may include unfractionated heparin, low-molecular-weight heparin, and oral anticoagulants.
- Chemotherapy agents may contribute to the development of VTE in patients with cancer; nurses should take special caution with patients receiving thalidomide therapy.
- Oncology nurses can assist with identification of risk factors for VTE in their patient population and are key in providing patient instruction for medical treatment options.