Deep Venous Thrombosis in Surgical Orthopedic Patients

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Introduction to DVT

- The term venous thromboembolism (VTE) is defined as a syndrome that collectively comprises deep vein thrombosis (DVT) and pulmonary embolism (PE). Each year, over 806,000 people die from this condition (Steffel et al., 2014). Unfortunately, the incidence rate for VTE remains very high, with an estimated risk of 30-50% of VTE patients will develop another VTE with in five years of the first incident (Steffel et al., 2014).
- Deep vein thrombosis (DVT) is blood clot that forms in a large vein, usually in an extremity, and a slow blood flow such as the leg or pelvis. Clots can form in the deep veins (DVT) or superficial veins (caused by superficial thrombophlebitis or phlebitis). Superficial blood clots rarely cause significant morbidity or mortality.
- A blood clot can detach or embolize, becoming mobile in the bloodstream. This phenomenon can lead to life-threatening conditions such as pulmonary embolism or deep vein thrombosis. While other risk factors exist, the incidence rate of DVT is known to increase with age, being highest in the elderly (Baser, Wang, Supina, & Rote, 2014). Unfortunately, the prevalence of VTE among patients in the United States remains high, with an estimated 806,000 cases annually (Baser, Wang, Supina, & Rote, 2014).
- Several prospective analyses have shown that VTE guidelines are not being routinely implemented (CMS, 2009). CMS no longer reimburses hospitals for VTE associated with total hip replacement surgery (Fisher, 2011). In addition, postoperative venous thromboembolic disease (VTE) is the third leading cause of mortality in the United States (Baser, Wang, Supina, & Rote, 2014). Venous thrombosis is temporally reduced for up to 6 days following a total knee replacement and for up to 10 days for factors that are normally diluted with an increase in the total blood volume and mobilization and swelling after surgery further contribute to reduced venous return and thus an increased risk of DVT.

Underlying Pathophysiology

In 1856, Rudolf Virchow postulated that hypercoagulability of blood, stasis of blood, and internal vessel wall injury are crucial to the development of DVT (Fisher, 2011). This postulate still stands today and is now referred to as Virchow’s triad. The hematostatic system is faced with the complex task of not only maintaining adequate blood circulation to sustain life, but also the life-saving ability to convert blood to an insoluble gel to assist in repair at site of vascular injury (McCannce, Huether, Austin, & Moral, 2017a). In venous blood flow, condition of low flow cause venous stasis which serves to induce hypercoagulability (Fisher, 2011). Arterial thrombosis, can cause arterial stasis which serve to induce hypercoagulability (Fisher, 2011). In arterial blood flow, condition of high blood flow and are mainly composed of platelet aggregates and fibrin (Sheehy, 2018). Arterial thrombus formation under conditions of high blood flow reduce platelet aggregation leading to the formation of a stable arterial platelet plug (McCannce, Huether, Austin, & Moral, 2017a).

While it is highly important for us to understand the disease processes associated with DVT in order to prevent future occurrences, we will now see how there may be no associated clinical findings in the extremities of asymptomatic cases of DVT (Meggial, 2011).

Presentation of Case

Fisher, W. (2011). The patient’s history includes a personal and family history of aspirin use. In an inpatient facility for intensive physical therapy following a right total knee replacement surgery, she was noted to have an increase in right calf edema. Upon physical examination, the patient’s right calf is noted to be more tender than the left, with a noticeable increase in right calf circumference. The patient does not report increased pain at rest or with movement, and does not report any changes in lower extremity edema or Swelling (McCannce, Huether, Austin, & Moral, 2017a). The patient has a history of hypertension, congenital heart defect (Fisher, 2011), and smoking. Upon physical examination the patient’s right calf is noted to be more tender than the left, with a noticeable increase in right calf circumference.

The patient does not report increased pain at rest or with movement, and does not report any changes in lower extremity edema or swelling. Similar descriptions of right calf pain and tenderness, along with a history of a negative Homans sign, can confirm a diagnosis of DVT or PE (McCannce, Huether, Austin, & Moral, 2017a). Localized tenderness is noted to be increased upon light palpation. The total blood flow restriction is increased, being well approximated, staples intact without any drainage, reddness or other signs or symptoms of selection noted. Given this patient’s recent surgical procedure, history of CHF and with the presented signs and symptoms, a DVT is highly suspected. A DVT venous ultrasonography is ordered.

Signs and Symptoms

The classic DVT signs and symptoms can vary from patient to patient. Generally, Patient’s may experience sudden edema or enlargement, and calf tenderness (McCannce, Huether, Austin, & Moral, 2017a). It is often difficult to determine if the signs and symptoms of DVT are present. A person with DVT may experience calf pain and swelling, along with a palpable pulse (McCannce, Huether, Austin, & Moral, 2017a). It is also possible to notice a new palpable pulse (McCannce, Huether, Austin, & Moral, 2017a). This condition is generally known as a “Pulmonary embolism” or a PE. The patient is at risk for a PE, and should be carefully monitored (McCannce, Huether, Austin, & Moral, 2017a).

Abnormal clots that adhere to the vessel wall are known as thrombi and are composed of platelet aggregates and fibrin (Fisher, 2011). Arterial thrombosis form under conditions of high blood flow and are mainly composed of platelet aggregates and fibrin (Fisher, 2011). Arterial thrombus formation under conditions of high blood flow reduce platelet aggregation leading to the formation of a stable arterial platelet plug (McCannce, Huether, Austin, & Moral, 2017a). Direct patient care staff including nurses and physicians play a key role in the primary prevention of DVT.

Significance of Pathophysiology

DVT is a life-threatening condition that imparts a considerable economic burden within the United States (Lauper, Stolherb, Mooya, & Bookhart, 2016). Each year, hundreds of thousands of patients develop DVT, which is a thrombotic complication of venous thromboembolic disease (CTD). The incidence of deep vein thrombosis in surgical orthopedic patients is one of the leading causes of mortality in the United States (Baser, Wang, Supina, & Rote, 2014). CMS no longer reimburses hospitals for VTE associated with total hip replacement surgery (Fisher, 2011). Unfortunately, the prevalence of VTE among patients in the United States remains high, with an estimated 806,000 cases annually (Baser, Wang, Supina, & Rote, 2014). Venous thrombosis is temporally reduced for up to 6 days following a total knee replacement and for up to 10 days for factors that are normally diluted with an increase in the total blood volume and mobilization and swelling after surgery further contribute to reduced venous return and thus an increased risk of DVT.

Implications for Nursing Care

In 2006, Rudolf Virchow postulated that hypercoagulability of blood, stasis of blood, and internal vessel wall injury are crucial to the development of DVT (Meggial, 2011). This postulate still stands today and is now referred to as Virchow’s triad. The hematostatic system is faced with the complex task of not only maintaining adequate blood circulation to sustain life, but also the life-saving ability to convert blood to an insoluble gel to assist in repair at site of vascular injury (McCannce, Huether, Austin, & Moral, 2017a). In venous blood flow, condition of low flow cause venous stasis which serves to induce hypercoagulability (Fisher, 2011). Arterial thrombosis, can cause arterial stasis which serve to induce hypercoagulability (Fisher, 2011). In arterial blood flow, condition of high blood flow and are mainly composed of platelet aggregates and fibrin (Sheehy, 2018). Arterial thrombus formation under conditions of high blood flow reduce platelet aggregation leading to the formation of a stable arterial platelet plug (McCannce, Huether, Austin, & Moral, 2017a). Direct patient care staff including nurses and physicians play a key role in the primary prevention of DVT.

Conclusion

It is now becoming increasingly recognized that VTE can have a far-reaching impact on patients, physicians, and other health care providers including hospitals and nursing facilities (Meggial, 2011). Direct patient care staff including nurses and physicians play a key role in the primary prevention of DVT.

References

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