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DVT and Economy Class Syndrome

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Introduction

Traveling long distances can be very stressful on the body. Deep vein thrombosis (DVT) has often been linked to long air flights or long distance travel in a vehicle. DVT is a blood clot usually formed in the legs. Economy Class Syndrome (ECS) has been referred to as the formation of a DVT occurring during (or just after) a long airplane flight, especially in economy class where there is the least space allotted per passenger and one's legs especially tend to be immobilized for lack of leg room (MedicineNet, 2012). Developing a DVT can lead to other life-threatening illnesses such as venous thromboembolism , pulmonary embolism, or myocardial infarction.

There are many destinations in the world that require many hours of travel. The flights required to get there could account for eight or more hours in an airplane. Prolonged travel with inactivity of greater than 3 hours can lead to DVT formation (Codina-Leik, 2014). It is not uncommon in one's medical career to cross path's with a patient who has developed a DVT during long distance travel. It is important for an advanced practitioner along with colleagues to identify patients who may have an increased risk for DVT especially those who may embark on long distance travel or who are experiencing symptoms after travel.

Figure 1. A passenger traveling with limited leg room. Clearly not an ideal position for adequate circulation leading to venous stasis. (Photo adapted from www.nhs.uk)

Pathophysiological Processes

DVT formation can be formed under many circumstances. Long distance travel is one of the conditions that provide an environment for increased risk of clot formation. During flights a passenger may have a window seat and choose not to get up and move so not to inconvenience a passenger next to them leading to venous stasis. In addition, a passenger may fall asleep in the limited space also leading to poor venous return and stasis. There are many times a mandated fasten seat belt sign could stay on, thus limiting a passenger the chance to get up and move around. A flight attendant serving food and beverages, thereby blocking the aisle also limits the opportunity for a passenger to get up or move around. Poor hydration due to lack of accessibility to fluids may increase blood viscosity and hypercoagulability. All these situations lead to an extended venous stasis and an increased risk of DVT formation leading to ECS.

Prolonged periods of inactivity caused by space limitations may slow circulation and produce edema (leg swelling). In addition, bent knees compress the popliteal vein (the deep vein behind the knee), creating a potential site for clot formation over time. Low oxygen, low humidity (dry air), and low cabin pressure at high elevations have a dehydrating effect that concentrate the blood, making it sluggish. The cabin environment on an airplane can expose a passenger to a hypobaric hypoxia state which may activate the clotting system. There are many studies that have shown an increase in the activity of clotting factor VII, VIII, and of D-dimer concentration from this type of environment. (Schriejer, 2006)

Rudolph Virchow came up with a famous triad called Virchow's Triad that helped explain what factors may be needed for clot formation. Virchow's Triad discovered in 1846 has stood the stand of time and continues to show that venous stasis, vessel wall injury, and hypercoagulability are the causal factors for thrombus formation (Meetoo, 2010).

Venous stasis during travel can result in an increase viscosity of the blood and the formation of microthrombi, which are not washed away by fluid movement; the thrombus that forms may then grow and propagate (Medscape, 2014). Platelet aggregation can often form near one of the large valves in the deep veins of the leg causing impaired circulation and blood flow to the extremity.

In certain scenarios one to all three of the factors may be present during travel. These 3 factors in the triad play an important role in understanding the pathophysiology behind clot formation.

Underlying Pathophysiology leading to DVT formation

- Venous stasis – decreased seat space, decreased mobility
- Hypercoagulability – dehydration, underlying clotting disorders, known or unknown
- Vessel wall injury – hypoxic state, hyperbaric state

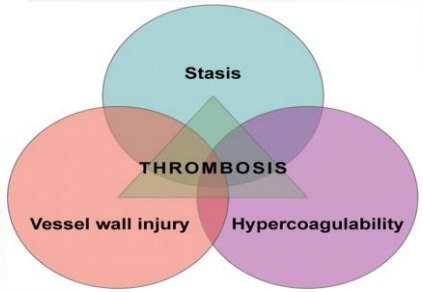


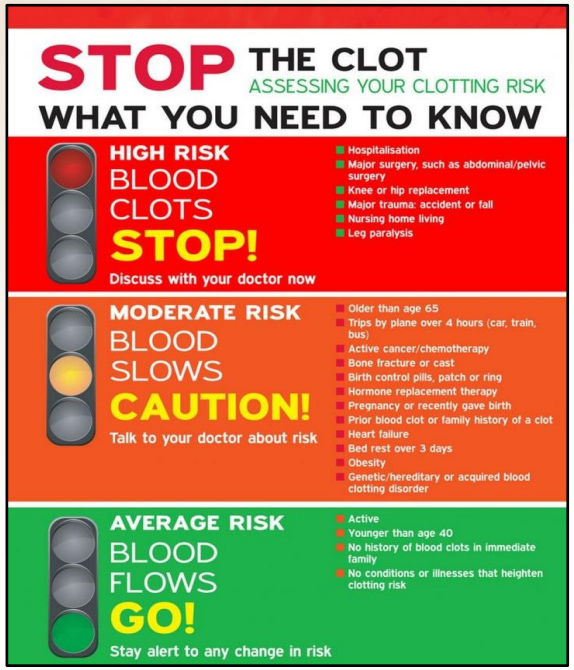
Figure 2. Virchow's Triad: Thrombus forms after changes in one of the three aspects of the triad. (Photo adapted from www.peacebridgehealthcare.com)

Signs and Symptoms

- Pain or tenderness in one or both legs that may occur only while standing or walking
- Tugging or heaviness in the affected leg when walking
- Leg fatigue
- Increased swelling of the affected extremity
- Increased warmth in the skin of the affected leg
- Vein distention in the affected leg
- Red or bluish discoloration of skin in the affected extremity
- A DVT can feel like a pulled muscle, cramp or "charlie horse" in the affected extremity

**Signs and symptoms of DVT usually occur unilaterally only in the affected extremity, while some patients may experience no symptoms at all.

Figure 3. Anyone can be at risk for developing a DVT while traveling long distances. (Photo adapted from US National Blood Clot Alliance http://stoptheclot.org)



Underlying Risk Factors for development of DVT

DVT can potentially affect anyone, however a variety of risk factors can increase your risk of developing a DVT. It is important to identify patients or individuals who may be at high risk for DVT. Along with the numerous risk factors above, venous stasis combined with air travel can increase the likelihood of DVT formation.

Complications of DVT

Figure 4. DVT formation can lead to serious complications, including death. (Photo adapted from www.pyroenergen.com)

Significance of Pathophysiology

DVT formation can be life threatening. A DVT can break loose and travel which is then called a venous thromboembolism (VTE). If the clot travels to the lungs, a pulmonary embolism (PE)will result. A PE is a major complication of DVT holding a mortality rate of 20%-40% an although preventable, almost 300,000 Americans die annually from DVT and it's primary complication PE (Fitzgerald, 2010).

Other complications of DVT include stroke, resulting when the VTE travels to the brain and myocardial infarction when VTE travels to the heart..

DVT does not discriminate by age, race or gender. Anyone can be affected under the right circumstances, even if they are otherwise healthy and active.

While the DVT itself may not be life-threatening , early recognition or diagnosis of DVT plays a major role in preventing these significant life-threatening complications.

Implications For Nursing Care

It is important to identify patients or individuals who may be at high risk for DVT. Education about risk factors for prevention of DVT especially before embarking on long distance travel is vital. Advising patients on staying well hydrated and attempting to move about as much as possible is necessary by the APN. Identifying those individuals at increased risk and advising those with recent immobilization due to injury or surgery to avoid travel is equally important.

There are many risk assessment tools available to evaluate those at increased risk for DVT. Below is just one example for an APN or patient to utilize.

Figure 5. Caprini DVT Risk Assessment Tool. (Photo adapted from www.isms.org)

Conclusion

Having an awareness of ECS and risk factors for DVT is imperative for the advanced practice nurse. DVT formation is absolutely preventable, but can be life threatening. It is important to identify patients or individuals who may be at a high risk for DVT. Educating patients on how to prevent DVT formation when traveling long distance on a flight or or in any vehicle is important. ECS is preventable and should be brought to the attention of anyone undertaking long distance travel. It is particularly important with those having underlying risk factors. ECS is a syndrome that people may not be aware of but through simple education by the APN, can provide others with a safer and healthier travel experience.

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