

The Use of Sequential Compression Devices in the Ophthalmic Surgical Patient

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Abstract

A pulmonary embolus (PE) is a blockage of the pulmonary artery caused by the formation of a clot. Fifteen percent of patients who develop a pulmonary embolus may die. What is the likelihood that the surgical ophthalmic patient will develop a pulmonary embolus during surgery? The risk is high, especially for patients with a multiplicity of health concerns, such as heart disease, diabetes, ischemia and obesity. Prophylactic measures are the key to managing the embolytic patient. The application of sequential compression devices (SCDs) is effective in preventing deep vein thrombosis (DVT), venous thromboembolism (VTE) and pulmonary embolus (PE).

There has been controversy over whether it is necessary to use SCDs as prophylaxes to prevent a pulmonary embolus (PE) in the ophthalmic surgical patient. The patients who are at greatest risk are those who have procedures lasting 30 minutes or more and those who have a multiplicity of health concerns. In the ophthalmic world, little consideration has been given to using SCDs. The question is, "What would be the likelihood that an ophthalmic patient develop a pulmonary embolus (PE) during surgery?" The answer would be "high," especially in patients with medical histories with poor prognoses.

What Is a Pulmonary Embolus (PE)?

A **PE IS A BLOCKAGE** of the pulmonary artery (or one of the branches), which occurs when a clot VTE (venous thromboembolism) dislodges from a vein.¹ It then embolizes to the arterial vessels in the lungs and inhibits breathing. Ophthalmic patients with a history of heart disease, compromised circulation, diabetes, renal disease or hypertension appear to be at greatest risk. The probability of embolus formation will increase if the procedure is lengthy, because of hemostasis in the lower extremities. Most emboli form in the proximal leg and are referred to as deep venous thrombosis (DVTs). A comprehensive pre-op medical evaluation should be done, particularly to address any medical problems that may potentiate the problem. Unfortunately, there have been reports of deaths in the ophthalmic patient where a pulmonary embolus was identified as being the primary cause.

Collaborative efforts are being orchestrated by medical professionals such as ophthalmologists, anesthesiologists, primary care physicians and nurses who are focusing their attention on prophylactic treatments to prevent PEs in the ophthalmic patient. Implementing preventive measures is the preferred and most effective treatment, because the results are usually positive. Patients who develop PEs are in imminent danger of having a respiratory crisis that often leads to mortality.

Signs and Symptoms of Pulmonary Embolus

The signs and symptoms of a PE are SOB (shortness of breath) or difficulty breathing, cough, chest pains, insufficient circulation, collapse and sudden death. Emergency intervention is critical during this time; airway management can prevent death.

The Joint Commission for the Accreditation of Healthcare Organizations (JCAHO) and other accrediting entities have mandated that standards be established and treatment regimens implemented to diagnose, manage and treat the embolytic patient. Many facilities have policies and procedures in place to manage a PE in other types of surgical patients who have abdominal, orthopedic and cardiac procedures. There is very little documented clinical data that addresses using SCDs during ophthalmic surgeries.

Causes of Pulmonary Embolus

Research and studies have been done to determine the causes of DVTs, identify ways to prevent occurrences and establish treatment regimens to manage the care of the patient in the event of a PE, and improved technological developments have decreased the incidence of mortality. According to *PEER*, approximately 13% to 21% of patients develop VTEs in the lower extremities and slightly more in the upper extremities. Forty-eight percent are at risk of death.

Evidence has shown that patients with the following conditions are at greatest risk for developing DVTs/PVTs:

- Previous history of DVTs/VTEs/PE
- Obesity
- MI/CHF
- Ischemia of lower extremities
- Stroke
- Blood disorders
- Respiratory distress
- Varicose veins
- Surgical procedures lasting more than 30 minutes
- Hip or knee fractures
- Malignancy
- Paralysis
- Age greater than 70
- Contraceptive use
- Trauma
- Major abdominal surgery

Patients with one or more of these risk factors are considered to be potential candidates for developing DVTs/VTEs that lead to PE. Fifteen percent of the patients who develop a PE “will die within 30 minutes of onset of the symptoms.”³

Recommended Treatment

Prevention is the key to managing an embolytic patient. Most patients who have health concerns are usually chronic and the best practice is to prevent complications. Improving circulation, reducing edema and hemostasis are paramount in the

prevention of a PE. SCDs are being prescribed as a first-line defense mechanism to prevent a PE. Some anesthesiologists recommend applying SCDs on the patient in the pre-op area to improve circulation while the patient is awake and mobile. SCDs are highly recommended for patients having procedures that last more than two hours. Examples of long procedures are pars plana vitrectomies, cornea graft and ocular traumas, which may last one to four hours or more. The ophthalmologist will usually leave the decision to use SCDs to the anesthesiologist or primary care physician.

A thrombolytic agent such as heparin is used to dissolve clots and improve circulation and is prescribed immediately as a first-line emergency drug to manage this life-threatening situation. Coumadin or Lovenox is used for long-term therapy to control the formation of clots. Early diagnosis and interventions to reduce the incidence of PE will minimize lengthy hospital stays and expenditures.

Sequential Compression Devices

Sequential compression devices (SCDs) are pneumatic devices used prophylactically to prevent DVTs, VTEs and PE. SCDs mechanically apply pressure to the lower extremities in order to improve venous and arterial circulation. Compression therapy squeezes the edematous, or swollen, extremity and breaks up pockets of fluid in the underlying tissues.² They improve blood flow by reducing ischemia and preventing clot formation. (*See Figure 1, next page*).

Anti-embolytic hoses (wraps) are applied proximally to both lower extremities from ankle to knee. Pneumatic cycles of inflation and deflation alternate between the cuffs. Forty mmHg of pressure is applied at 30-second intervals. Venous circulation is improved during surgery by mechanical means. The continuation of SCD therapy is prescribed throughout the post-op recovery phase or until the patient is able to ambulate. SCDs are most effective when the patient is unable to actively flex or move the legs and when they are immobile. Removing the SCDs before ambulation is recommended to avoid trips or falls. (*See Figure 2, next page*).

Using these devices has proven to be an effective method of reducing the incidence of PE in the ophthalmic patient with multiple health issues. Circulation was improved and there was a reduction in severely edematous extremities. In recent years, the mortality rate related to PE has been reduced nationwide by using SCD therapy.

SCDs are manufactured by several companies. Some studies have shown that none are more superior to the others. The functionality of the pump and hose is based on the same principle, which is to aid circulation by inflating and deflating a cuff wrapped around the extremity, thereby preventing DVTs or VTEs. The effectiveness of the different styles of SCDs has shown to be comparable in overall results.

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FIGURE 1

Sequential Compression Device Pneumatic Pump

FIGURE 2

Sequential Compression Device Extremity Hose**Summary**

In summarization, the ophthalmic care giver should consider using SCDs on surgical patients who have major health issues such as ischemia, heart or renal disease and other chronic debilitating conditions. Patients who have procedures lasting more than two hours are also candidates. However, SCDs may also be necessary on patients with edema or severe circulatory problems who have short procedures. The use of SCDs should be determined by the physical condition of each patient and according to their individual medical needs. The use of a SCD is an excellent prophylactic treatment for the prevention of a pulmonary embolus that may lead to mortality.

References

- Neurology*, Vol. 50, Issue 6 (June 1998). Kamran Saadat I., MD, Downey Deborah, RN, MSN, Ruff Robert L., MD, PhD. Pneumatic sequential compression reduces the risk of deep vein thrombosis in stroke patients. American Academy of Neurology.
- American Journal of Nursing*, Vol. 108, No. 4 (April 2008). Johnston Janet, MSN, JD, RN, Davis Monica, MSN, MBA, CRNP. When Sequential-Compression Devices Cause Falls.
- PEER (Professional Evolving through Education and Research)*, Vol. 1, Issue 1, Nursing Research Committee, Methodist Hospital, March 2006.
- Salzman et al. *The Epidemiology, Pathogenesis, and Natural History of Thrombosis*. 1994. J.B. Lippincott.
- Regence, Durable Medical Equipment Section. Pneumatic Compression Device, 1998.
- Health Technol Assess*. 2005 Dec. 9 (49): III-IV, IX-X, 1-78; Roderick P., Wilson K., Hall H., Jackson D., Collins R., & Baigent C.
- Wikipedia, 1999, Pulmonary embolism, wikipedia.org.

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