Implementation of Mechanical VTE Prophylaxis in Non-OR Locations

Sidney E. Perles, LT, MC, USN; Susanna Byrne, LCDR, MC, USN
Naval Medical Center San Diego, Department of Anesthesiology

Background
Venous thromboembolism (VTE) is a serious and possibly life-threatening postoperative complication that includes deep vein thrombosis (DVT) and pulmonary embolism (PE) with an annual incidence of 70,000 to 600,000 following surgical operations in the United States. In addition to medical-surgical cases, VTEs also impose a significant economic and health care burden with hospitalizations costing roughly $12,000 per patient, amounting to billions of dollars per year. The risk for VTE formation begins with perioperative immobility and administration of anesthesia and continues throughout the postoperative phase of care until the patient regains mobility. Sequential compression devices (SCDs) can reduce the incidence of VTEs using an inflation-deflation cycle of intermittent compression to improve venous circulation and reduce venous stasis in the lower limbs of patients.

A comprehensive literature review revealed that there are both patient- and procedure-related factors that place higher risk for postoperative VTE, regardless of type of surgery or type of anesthesia and these patients should receive mechanical VTE prophylaxis. However, to date, no institutional guidelines have been established for the use of mechanical VTE prophylaxis on patients receiving anesthesia in our non-Operating Room (OR) settings such as the Combined Endoscopy Center (CEC), Interventional Radiology (IR), Cath Lab, and Electrophysiology (EP) Lab. Consequently, our higher VTE risk patients do not currently receive mechanical VTE prophylaxis in our non-OR locations.

Solution
Starting in January 2021, we developed a Standard Operating Procedure (SOP) for the Department of Anesthesiology identifying patients undergoing anesthesia in our non-OR locations that should receive perioperative mechanical VTE prophylaxis, in the form of sequential compression devices (SCDs), to prevent VTE and subsequent PE. The SOP states that SCDs should be used on any patient undergoing anesthesia in our non-OR settings (like CEC, IR, Cath Lab, EP) having one or more of the listed patient- or procedure-related risk factors. Given the low cost and low risk of SCDs, the potentially devastating clinical consequences of sequelae from a postoperative DVT, and the high financial burden of treating these sequelae, we recommend that SCDs be used for the population of patients.

Policy
Based on a systematic review of available evidence and published guidelines, this policy establishes standardized criteria to determine which patients undergoing anesthesia in non-operating room locations should receive perioperative mechanical prophylaxis, in the form of sequential compression devices (SCDs), to prevent a venous thromboembolism (VTE) and subsequent pulmonary embolus (PE).

The risk of a VTE during the perioperative period is multifactorial to include patient factors, type of procedure/surgery, type of anesthesia, vascular injury, hyperviscosity, and period of immobility. General anesthesia causes vasodilatation leading to an increase in venous stasis, increase in venous capacity, and decrease in venous return, all of which contribute to the risk for a VTE. Additionally, there are other factors that elevate the risk for perioperative VTE, regardless of type of anesthesia. This policy aims to assist in identifying patients at elevated risk of VTE to ensure SCDs are utilized.

Based on the available evidence, SCDs should be used on any patient undergoing anesthesia having at least one of the following VTE risk factors in non-OR settings:

- Patient-related
  - Previous history of VTE
  - Congestive heart failure
  - Active malignancy or cancer treatment
  - Active pregnancy or post-partum
  - Use of oral contraceptive products or hormone replacement therapy
  - Venous stasis/phlebitis
  - Age > 60
  - Impaired status
  - Active heart failure
  - Respiratory failure
  - Central Venous Catheter in situ
  - Inflammatory Bowel Disease
  - Intraoperative repositioning
  - BMi >/= 30
  - Recent MI or stroke
  - Diabetes
  - Infection (to include lower limb fractures, cast, or immobility devices)
  - Prior and current neurologic injury

- Procedure-related
  - Surgery/ERAS
  - General anesthesia

Locations
The SCDs, SOP, and laminated patient- and procedure-risk factor cards will be available for review in these non-OR locations:

Procedures
All adults patients scheduled for outpatient or inpatient procedures in Radiology (Interventional radiology, CT scan, hybrid operating room, MRI), Combined Endoscopy Center (CEC), and Cardiology (EP and Cath Lab) will be triaged for consensus sedation versus Monitored Anesthetic Care (MAC). VTE prophylaxis was not initiated until the start of anesthesia.

All adults patients will be assessed for VTE risk factors. Any patient having at least one listed patient or procedural related risk factor will have SCDs placed and inflated prior to the start of anesthesia. These will remain in place until the end of the anesthesia and the patient is either ambulating or discharged from the Non-Operating Room location.

Any adult patient currently on VTE chemoprophylaxis should be evaluated by the anesthesia provider to determine if SCDs should also be utilized during the procedure.

The anesthesiologist or sedation nurse should assess the patient for potential contraindications related to use of SCDs, including increased bleeding risk, heart failure, peripheral vascular disease, pre-existing DVT, lower extremity conditions associated with intermittent mechanical compression (e.g. dermatitis, recent skin graft, gangrene), lower extremity factors that prevent correct fitting of sleeves (e.g. worsening the size limit, deformity), and an allergic sensitivity to SCD material.

Since the SCD machine is not Magnetic Resonance Imaging (MRI) compatible, the anesthesiologist and nurse should ensure that anti-embolism compression stockings are worn by high risk patients undergoing MRI procedures.

The anesthesiologist and nurse in the procedural area should assess the patient for adverse effects related to the SCDs including shin injury, hypothermia, numbness, tingling or pain, and ischemia. To prevent falls, the SCDs should be removed prior to patient ambulation and discharge.

References

[Insert references here, including author names, titles, and publication dates]

Image: [Image description or source]