BRIEF CLINICAL UPDATE

Update on Mechanical Venous Thromboembolism Prophylaxis

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Case Report

Venous thromboembolism (VTE) represents a major US public health issue that impacts 350,000 to 600,000 people with 100,000 associated deaths. VTE is a common cause of preventable hospital death. Patients who are hospitalized or recently hospitalized for acute medical illness or surgery are at risk for deep vein thrombosis (DVT) and pulmonary embolus (PE). Methods of VTE prevention have historically included pharmacologic and mechanical prophylaxis (eg, graduated compression stockings and intermittent pneumatic compression). While intermittent pneumatic compression (IPC) is an effective means of mechanical VTE prophylaxis, the benefit of graduated compression stockings (GCS) is questioned in recent literature.

Recent trials suggest that graduated compression stockings may not be effective in preventing venous thromboembolism. Morris et al reviewed trials comparing GCS and IPC between 1970 and 2008 and reported a cumulative DVT rate of 5.9% with GCS as compared to 2.8% with IPC. Studies in critically ill patients demonstrated lower VTE incidence with IPC versus GCS. In the CLOTS 3 trial, rates of DVT were examined in immobile stroke patients randomized to treatment with or without IPC. DVT occurred less frequently in stroke patients treated with IPC, with an absolute risk reduction of 3.6%. The CLOTS trials found no statistically significant benefit of GCS on VTE or survival.

CLOTS 1 did not show GCS to reduce DVT after stroke when compared to no mechanical prophylaxis. Higher-risk groups, including patients with leg weakness and patients not on concomitant anticoagulation, also did not benefit from GCS. CLOTS 1 and 2 found patients treated with GCS had a small but non-significant increased hazard of death in the first 6 months. CLOTS 2 demonstrated increased proximal VTE with the use of below-the-knee stockings as compared with thigh-high stockings. However, a Cochrane review indicated a dearth of high-quality evidence to distinguish between the efficacy of knee-length and thigh-length graduated compression stockings. In a review of 4 trials including 1,171 orthopedic patients, Patel et al did not find decreased VTE rates when GCS were added to pharmacologic prophylaxis. Some studies in surgical patients have demonstrated the benefit of GCS, and surgical guidelines recommend the use of GCS or IPC as a means of mechanical prophylaxis.

Use of GCS is costly and associated with adverse skin effects. GCS are challenging to fit and properly maintain. There are twenty-eight different sizes of GCS. The calf and thigh circumference must be measured by skilled personnel for appropriate sizing. Incorrect sizing can result in an increased risk of DVT. GCS should be monitored at least 3 times daily for skin breakdown and migration of the stockings. Discomfort and inconvenience may lead to suboptimal compliance. Skin breakdown is common including skin ulcers, breaks, and necrosis. In the CLOTS 1 trial, skin breaks and ulcers were 4 times more common in the group treated with GCS (64 vs. 16%). In the CLOTS 2 trial, skin breakdown occurred in 3.9% of patients treated with thigh-high stockings and 2.9% with below-the-knee stockings. One case reported improperly fitted graduated compression stockings placed during surgery led to lateral leg compartment syndrome.

CHEST guidelines for prevention of VTE include both GCS and IPC as methods of mechanical prophylaxis. Low-risk patients who are ambulatory and/or hospitalized <48 hours should not be prescribed mechanical prophylaxis as this impedes ambulation and can increase risk of falls. Pharmacologic prophylaxis in a low-risk population can increase bleeding risk. Mechanical prophylaxis is indicated when pharmacologic prophylaxis is contraindicated in patients at moderate and high-risk for VTE. All high-risk patients should be treated with mechanical and pharmacologic prophylaxis unless contraindications exist. Based upon CHEST guidelines, critically ill patients can be treated with GCS or IPC. However, these guidelines recommend IPC for orthopedic surgery patients.

With the implementation of the EMR at UCLA in March 2013, VTE prophylaxis ordering was consolidated and standardized. Prior to the EMR, there were multiple orders sets with variability between services. Variable practice patterns were based on different VTE risk assessments and population-specific risk. The EMR provides a VTE prophylaxis order set based upon global VTE risk rather than patient-specific VTE risk factors. IPC, but not GCS, is the standard option for mechanical VTE prophylaxis. A review of the CLOTS trials and other recent studies suggests that use of GCS in non-surgical patients may not be effective and may increase risk of DVT. Moreover, GCS is associated with skin breakdown and cost.
REFERENCES


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