Patient Satisfaction With Mobile Compression Devices Following Total Hip Arthroplasty

Craig J. MCasey, MD; Jeanine M. gargiulo, PA-C; Nancy L. Parks, MS; William G. Hamilton, MD

Abstract

The goal of this study was to evaluate patient satisfaction with the use of a mobile compression device after anterior total hip arthroplasty. Two hundred forty-seven patients used the mobile compression device for 10 days after surgery with recommended adjunctive 325 mg aspirin therapy. The device has a rechargeable battery pack that weighs 1.65 lb and is attached to compression sleeves worn over the calves of both lower extremities. It delivers sequential compression to the sleeves at a pressure of 50 mm Hg for about 10 seconds at a cycle of 1/min and is synchronized to the patient’s venous blood flow pulses. A questionnaire was administered to all patients at 1-month follow-up to gauge patient perception of the device. There were 14 questions about comfort, noise, cost, pain, skin breakdown, rash, and falls related to the device. Overall, 234 of 247 (94.7%) patients stated that they would use the device again. The most common complaint from patients was that the mobile compression device was cumbersome (63.6%). Twenty-five patients (10.1%) reported having a fall while using the device, although no fall-related injuries were documented. Therefore, the authors recommend counseling patients about fall risk and reminding them to use caution while moving about with the device. Despite the limitations described in this study, the data confirmed that patients who used the device had an overall positive response to the system and would choose to use the device again rather than using chemical agents for deep venous thrombosis prophylaxis.
Various options for venous thromboembolism prophylaxis are available after primary total hip arthroplasty (THA). Current guidelines from the American Academy of Orthopaedic Surgeons recommend that patients undergo chemoprophylaxis and/or mechanical prophylaxis in the absence of elevated risk of thromboembolism or bleeding. In February 2012, the American College of Chest Physicians recommended chemoprophylaxis, mechanical prophylaxis, or both over no prophylaxis, with a preference for low-molecular-weight heparin. Although there is agreement that prophylaxis is necessary, irrespective of the risk of venous thromboembolism, it is up to the provider to weigh the risks and benefits of each option.

Chemotherapeutic options, including adjusted-dose warfarin (Coumadin) and low-molecular-weight heparin, have low rates of venous thromboembolism, but several reports showed an increased rate of postoperative bleeding complications. These agents also pose difficulties for both patients and providers because of the need for blood draws and monitoring (Coumadin); the anxiety, pain, and complication of self-injection (low-molecular-weight heparin); and increased cost. Pneumatic compression devices have a long history of use but are limited to the inpatient setting because of concerns about comfort, safety, and compliance. More recently, a sequential compression device was developed that allows outpatient use. This device incorporates a compliance monitor and is designed for improved comfort. Multiple studies have shown low rates of venous thromboembolism with this mobile compression device when used in conjunction with aspirin in standard-risk patients. To the authors’ knowledge, no study has examined patient perception of the device. The goal of this study was to report patient satisfaction with the use of a mobile compression device (Active Care+SFT, Mobile Compression Systems, Ltd, Or Akiva, Israel) after THA.

**Materials and Methods**

This study was a case series of 247 patients who used the mobile compression device for deep venous thrombosis (DVT) prophylaxis after primary THA. These patients completed a survey postoperatively to communicate their experience with the Active Care mobile compression device.

Starting in 2009, all patients who underwent primary THA were evaluated at the time of surgical scheduling for risk of venous thromboembolism. Patients who had a history of DVT or pulmonary embolism or those who had a malignancy within the past 2 years were considered at higher risk for VTE and did not use a mobile compression device. All other patients were given 2 options, Coumadin or a mobile compression device, for postoperative venous thromboembolism prophylaxis. The pros and cons of each option were explained. During a period of 13 months (January 2010 to February 2011), 247 patients used the mobile compression device after primary THA. All of them completed a satisfaction questionnaire.

Active Care+SFT is a mobile compression device with a rechargeable battery pack that weighs 1.65 lb and is attached to compression sleeves worn over the calves of both lower extremities. Cotton stockinette material is placed between the compression sleeve and the skin to reduce irritation. The device delivers sequential compression to the sleeves at a pressure of 50 mm Hg for approximately 10 seconds at a cycle of 1/min and is synchronized to the patient’s venous blood flow pulses. The device is battery operated, with a battery life of 5 hours, allowing patients the freedom of mobility outside of the home. The device can also monitor patient compliance.

A single surgeon (W.G.H.) performed all 247 THA procedures via a direct anterior approach. The mobile compression device sleeves were applied to the patient’s calves in the preoperative holding area before initiation of anesthesia and worn on both lower extremities throughout the surgery. Postoperative mobilization was begun either on the day of surgery or on the morning of the first postoperative day with physical therapy. Weight bearing as tolerated was allowed with an assistive device (walker, crutches, or cane). Patients were discharged on day 2, but the mobile compression device was continued for 10 days postoperatively. Patients were instructed to wear the device for a minimum of 20 h/d. For patients without a contraindication, 325 mg enteric-coated aspirin twice daily was prescribed for 4 weeks.

All patients were seen for follow-up 4 to 6 weeks after surgery. As was the authors’ protocol for many years, lower-extremity Doppler ultrasound was performed at this visit to screen for the presence of blood clots. A patient questionnaire (Figure 2) was also administered at this visit. Patients were asked a specific
set of questions about the use of the portable compression device. There were 14 questions on comfort, noise, cost, pain, skin breakdown, rash, and falls related to the device. Patients were asked to give a simple yes/no response and were able to comment. The questionnaire also recorded patient knowledge of venous thromboembolism prophylaxis and perception of other anticoagulants such as Coumadin.

**RESULTS**

The study group included the 247 patients who completed the questionnaire and had a Doppler ultrasound. Responses showed that, despite several complaints, there was an overall positive response to the mobile compression device, with 234 of 247 (94.7%) stating that they would choose to use the device again if they had another THA. The most common complaints were that the device was uncomfortable (80.1%), was cumbersome to use (63.6%), was noisy (31.6%), caused skin problems (10.5%), caused a rash (8.5%), caused a fall (10.1%), and was painful (3.6%). One fourth of patients (63 of 247) had a negative perception of Coumadin usage from personal or familial experience. The most frequent comments included fear of bleeding complications and difficulty obtaining or maintaining therapeutic levels.

A DVT was detected by ultrasound in 2 of 247 patients (0.8%), both of whom were asymptomatic. One patient had an asymptomatic occlusive left peroneal vein DVT, and the other had an acute non-occlusive thrombus of the superficial femoral vein. The risks and benefits of anticoagulation therapy were discussed with both patients. The first patient chose to forego treatment, and the second patient underwent treatment with Coumadin for 3 months. No pulmonary emboli occurred by the 4-week follow-up, and no bleeding complications (hematoma, draining wound, or reoperation) were found in this cohort of patients.

**DISCUSSION**

Finding an ideal management strategy for postoperative venous thromboembolism prophylaxis is a multifaceted problem for both the physician and the patient. The factors associated with an ideal prophylactic venous thromboembolism regimen include low risk of venous thromboembolism, low risk of complications, optimal patient safety, low cost, compliance, and patient satisfaction. Currently, no method meets all of these criteria. This study focused on patient satisfaction with a noninvasive method of venous thromboembolism prophylaxis that has been proven to be effective.11 Additionally, the authors sought insight
into patients’ perception of the mobile compression device as well as the use of anticoagulants.

Limitations of the study include variation in the postoperative protocol with regard to aspirin therapy. The authors prescribed aspirin 325 mg twice daily, but could not confirm patient compliance. This may have an effect on the number of thrombotic events possible for the study, given the added benefit of the effect of aspirin on platelet function. Both of the DVTs that were recorded in the postoperative period occurred in patients who did not take aspirin. One patient was treated with enoxaparin (Lovenox)/Coumadin in the postoperative period for a nonocclusive superficial femoral vein thrombosis, and the other patient had an occluded peroneal vein that was observed. Compliance with use of the mobile compression device can be measured, but the authors did not collect data on this during the study. Compliance can affect the outcomes of any method of postoperative anticoagulation. A future study might compare compliance in patients who reported that the devices were uncomfortable or cumbersome with compliance in those who did not. Despite the limitations reported in this study, the data confirmed that patients who used the device had an overall positive response to the system and would choose to use the device again if needed.

The benefit of a mechanical regimen lies in the reduced risk of complications that can be seen when using a chemoprophylactic regimen such as low-molecular-weight heparin or Coumadin. Burnett et al. showed a significantly higher rate of complications in patients undergoing primary THA when treated with a 10-day regimen of low-molecular-weight heparin compared with Coumadin. Major complications (DVT, pulmonary embolism, heparin-induced thrombocytopenia, re-admission, return to the operating room) were found in 9% of patients treated with the Lovenox regimen. In addition, minor complications (related to prolonged wound drainage) were present in 15% of patients with primary THA. Coumadin prophylaxis has shown variable rates of postoperative wound and bleeding complications but less so than in patients treated with low-molecular-weight heparin (9% vs 2.1%). However, Coumadin has additional costs and inconvenience associated with postoperative therapy, including the cost of monitoring prothrombin time/international normalized ratio and frequent blood sampling.

This study included all patients who wore the mobile compression device for a period of 10 days with adjunctive 325-mg aspirin therapy recommended for 4 weeks. The mobile compression device offers a lower risk of wound complications, such as drainage or hematoma formation, but it is associated with a certain amount of inconvenience. Although the device is small and lightweight (1.65 lb), patients must wear or carry the device with them. It connects to the compression sleeves via tubing that can become tangled or caught on surrounding objects. The sleeves, which extend from below the knee to above the ankle, can be uncomfortable to wear. The unit produces a humming noise when cycling, and this was disturbing to some patients. A power source is necessary for recharging the unit because battery life is limited to 5 hours. Finally, coverage for the device is inconsistent among insurers. The device typically costs about $30/d, for out-of-pocket expense to the patient of $300 for the duration of therapy.

This study showed that patient satisfaction with the device was very high, but some patients had complaints about its use. The 2 complaints of most concern to both the patient and the surgeon involved skin complications and falls. Approximately 10% of patients reported 1 or both of these complications. Certainly, there are safety concerns for patients, especially elderly patients with impaired balance or poor skin quality. The authors’ fall rate without the device is unknown and may be a topic for future study. The authors recommend educating patients about fall risk and counseling them to use caution while moving about with the device.

Although there is no ideal method of venous thromboembolism prophylaxis in patients undergoing primary hip replacement surgery, overall patient satisfaction was very high within the study group (94.7%). Despite some inconveniences, patients reported that they preferred this method of venous thromboembolism prophylaxis to treatment with chemoprophylaxis during the postoperative period. With comparable rates of postoperative venous thromboembolism and reduced risks of wound complications, this strategy is a viable option after primary THA.

REFERENCES

