Preoperative mechanical prophylaxis in elderly patients with hip fracture

Nam JH,Kim DH,Yoo JH,Hwang JH,Chang JD

Abstract

Background Elderly patients undergoing hip fracture surgery (HFS) are at increased risk of postoperative venous thromboembolism (VTE). Therefore, combined postoperative mechanical and chemical thromboprophylaxis has been routinely performed after HFS in these patients. This retrospective case-control study was conducted to evaluate the additional effectiveness of preoperative mechanical thromboprophylaxis on the prevention of VTE following HFS in elderly patients.

Methods Of 539 consecutive patients aged 70 years or older undergoing HFS, 404 (control group) did not receive preoperative mechanical thromboprophylaxis while 135 (study group) received mechanical thromboprophylaxis using an intermittent pneumatic compression device and graduated compression stockings from the time of admission until surgery. All patients received combined postoperative mechanical and chemical thromboprophylaxis following HFS in accordance with the same protocol. The incidence of symptomatic VTE confirmed by clinical symptoms and 3-dimensional CT angiography within one month of surgery was investigated in both groups.

Results American Society of Anesthesiologists grade was higher (p=0.016) in the study group and more patients in this group had concomitant cardiovascular and neurologic diseases (p=0.005 and p=0.009, respectively). Meanwhile, more patients in the study group had received anticoagulant medication preinjury owing to comorbidities (39% vs 28%, p=0.025). The overall incidences of symptomatic deep vein thrombosis (DVT) and pulmonary embolism (PE) were 7.4% and 3.7% in the control group and 2.2% and 1.5% in the study group, respectively. On multiple logistic regression, symptomatic DVT significantly reduced in the study group (OR 0.28, p=0.042), meanwhile there was no significant difference in the incidence of symptomatic PE between the two groups (p=0.223).

Conclusions Preoperative mechanical thromboprophylaxis may confer an additional benefit by preventing postoperative VTE without adding more risk of perioperative bleeding in elderly patients with hip fracture.

Citation: Nam JH,Kim DH,Yoo JH,Hwang JH,Chang JD Preoperative mechanical prophylaxis in elderly patients with hip fracture. **protocols.io**

dx.doi.org/10.17504/protocols.io.jfscjne

Published: 17 Aug 2017

Protocol

Step 1.

We retrospectively reviewed 614 consecutive patients over 70 years of age who underwent surgery for a femoral neck or an intertrochanteric fracture between January 2012 and June 2016 in a single university hospital. These patients underwent intramedullary nailing for an intertrochanteric fracture and bipolar cementless hemiarthroplasty for a femoral neck fracture during the study period. Forty-seven patients who had been at bed-ridden status before the injury, with a previous history of a thromboembolic event, or expired due to the causes unrelated to index surgery within one month after HFS were excluded. Seven patients in whom the occurrence of VTE could not be confirmed within one postoperative month due to follow-up loss or patients' refusal to undergo the imaging study after discharge, were also excluded. In addition, 21 patients who had been treated with warfarin were also excluded because these patients continuously took LMWH therapy instead of warfarin preoperatively after admission. Of the remaining 539 patients, 166 took aspirin-containing compounds or other antiplatelet medication preinjury. Because their medications were discontinued at admission, these patients were not excluded. Thus, 539 patients: 392 women and 147 men were the subjects of this study (Fig 1).

The study period of 54 months included 36 months before and 18 months after the initiation of preoperative mechanical thromboprophylaxis. Patients enrolled in the current study were divided into two groups. Patients in the control group (404 patients) who underwent HFS from January 2012 to December 2014 did not receive preoperative mechanical thromboprophylaxis. Those in the study group (135 patients) undergoing HFS from January 2015 to June 2016 received preoperative mechanical thromboprophylaxis from the time of admission until surgery. Demographic data such as age, gender, body mass index (BMI), fracture site, American Society of Anesthesiologists (ASA) grade, and comorbidities were collected from the electronic patient records of our hospital. Data on comorbid medical condition were categorized based on the presence of the following conditions: cardiovascular diseases, pulmonary diseases, endocrinological diseases, neurologic diseases, psychotic diseases, nephrological diseases, and cancer. In addition, the time to operation after admission, operation time, length of hospital stay, and the method of anesthesia were collected.

All patients in both groups received combined chemical prophylaxis for 10 to 14 days and mechanical prophylaxis until discharge (for about 2 weeks) for VTE after HFS according to the same protocol. According to our protocol, LMWH was used as a chemoprophylactic agent of VTE and subcutaneous administration of once-daily 40 mg enoxaparin commenced 24 hours after the index surgery. All patients received medication for a total of 10 to 14 days. Mechanical thromboprophylaxis was performed using an IPCD and GCS simultaneously to enhance its efficacy both preoperatively and postoperatively in the study group and only postoperatively in the control group and continued until discharge. The IPCD (Kendall Express 9525 SCD: Covidien, Dublin, Ireland) used in the current study consisted of a garment which is fitted to the calf and thigh. The garment was inflated by a pump and deflated every 35 to 45 seconds according to venous refilling time of the patient. The inflated pressure was 45 mmHg in ankle, 40 mmHg in calf and 30 mmHg in thigh. This IPCD was applied in the calf and thigh of both legs for all the time. Although the actual working time of IPCD depends on the patient's compliance, most of our patients used IPCD all days and nights. Thigh-length GCS were also applied for all the times.

Postoperative rehabilitation that focused on early mobilization was performed according to our protocol. Tolerable weight-bearing standing and ambulation using a walker were started from two to three days after surgery. Most of elderly patients undergoing HFS were hospitalized for about 2 weeks after surgery because the National Public Health System and private health insurance companies covered most of the cost in our country. Then, these patients were transferred to department of Rehabilitation in our hospital or affiliated rehabilitation centers or nursing facilities for continuous rehabilitation for about 2 to 3 weeks.

Postoperative routine surveillance for both DVT of lower extremity and pulmonary embolism (PE) was not performed. The symptoms or signs of suspected thromboembolic events were investigated and recorded. Three-dimensional computed tomography (3-D CT) angiography was performed at any time postoperatively if VTE was clinically suspected within one month after the index surgery. Both the cardiovascular specialist and the radiologist made the final diagnosis of DVT in suspected patients, and both the pulmonary specialist and radiologist confirmed PE. Finally, efficacy outcomes in this study included the incidence of the following VTE events observed up to one month after surgery. Warfarin or rivaroxaban was given to all patients with confirmed VTE.