

## Correspondence

# Thromboprophylaxis for venous thromboembolism prevention in hip fracture patients

*Sir,*—I read with interest the study by Leer-Salvesen et al. (2016) and I would like to compliment the authors for a thorough study. It shows that preoperative start of thromboprophylaxis with low-molecular-weight heparin (LMWH) decreases 6-month mortality in femoral neck fracture patients receiving hemiarthroplasty. In a clinical setting, LMWH is a common chemoprophylaxis for venous thromboembolism (VTE) prevention. From the article, yet no VTE occurrence is stated. VTE is a major problem after hip fracture. Development of VTE is anticipated in the interval between the time of fracture and surgery since hip fracture patients cannot move the injured extremity during this period, while patients undergoing elective total joint arthroplasty are mobile. Preoperative VTE is known to occur in 3–62% of hip fracture patients (Salzman and Harris 1976, Zahn et al. 1999, Song et al. 2016). Yet no preoperative VTE is documented at the time of admission in the study. VTE is also a significant risk factor for mortality. The mortality risks for patients with VTE were markedly higher during the first year, especially within the first 30 days after VTE diagnosis (Søgaard et al. 2014). Still, no association analysis was made between VTE and mortality in the study. Failure to bring VTE into the equation makes the association between thromboprophylaxis strategy and mortality hard to interpret in clinical practice. I would appreciate the authors' thoughts on this.

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*Sir,*—We thank dr Yang Huilin and dr Sun Ye for the comments on our recently published article.

The aim of our study was to investigate the effect of preoperative and postoperative low-molecular-weight heparin on hard clinical outcomes in emergency hip fracture patients undergoing surgical treatment with prosthetic implants.

The rationale was based on the following: A tissue trauma and in particular bone trauma (including impaction of cement) causes release of potentially toxic molecules that trigger systemic activation of coagulation. This may cause clot formation at sites of local minor resistance both on the venous and arterial side and organ damage. Frail elderly operated for hip fractures may experience a multitude of complications triggered by cell destroying molecules and thrombin activity like respiratory distress, heart and brain ischaemia, hepatic and renal dysfunction and local limb thrombosis at the site of trauma as reviewed by an international expert group (Dahl et al. 2015). Thus, by controlling thrombin we have reason to believe that mortality can be reduced beyond solely preventing non-fatal and fatal venous thromboembolism (Dahl et al. 2005).

Based on this awareness we conducted the reported clinical study that showed that LMWH administered before surgery was superior to postoperative initiation in frail elderly undergoing hip fracture treatment with prostheses (Leer-Salvesen et al. 2016). Mortality and reoperations were significantly reduced with preoperative LMWH administration already on day 7 and continued to be consistent 1 and 6 months after surgery.

Concerning your statement on venous thrombosis we have the following remarks. Radiological VTE screening has mainly been conducted with venography and even recently ultrasonography. The methods have technical limitations (sensitivity, specificity, interobserver variations, drop outs etc.) and aim to diagnose subclinical thromboses. These challenges and definite diagnostic criteria do explain the huge differences found in the referred articles suggesting a preoperative VTE rate of 3–62% (Salzman and Harris 1976, Zahn et al. 1999, Song et al. 2016).

We expected patients with a long preoperative waiting time to be at a higher risk of severe outcomes. Interestingly, this huge cohort did not reveal any independent effect of preoperative delay on the risk of postoperative death or reoperation. Accordingly, the length of time between fracture and operation did not impact the advantageous effect of a preoperative start of the prophylaxis.

The latest American College of Chest Physicians (ACCP) guideline committee requested studies with clinical outcomes and not surrogate endpoints (Falck-Ytter et al. 2012). Our study responded on this demand.

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