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Association for Academic Surgery

Early thromboprophylaxis with low-molecular-weight heparin is safe in patients with pelvic fracture managed nonoperatively



Faisal Jehan, MD,^a Terence O’Keeffe, MD,^a Muhammad Khan, MD,^a
 Albert Chi, MD,^b Andrew Tang, MD,^a Narong Kulvatunyou, MD,^a
 Lynn Gries, MD,^a and Bellal Joseph, MD^{a,*}

^a Division of Trauma, Critical Care, Emergency Surgery, and Burns, Department of Surgery, University of Arizona, Tucson, Arizona

^b Division of Trauma, Critical Care & Acute Care Surgery, Department of Surgery, Oregon Health & Science University, Portland, Oregon

ARTICLE INFO

Article history:

Received 9 February 2017

Received in revised form

22 May 2017

Accepted 16 June 2017

Available online 24 July 2017

Keywords:

DVT

LMWH

Thromboprophylaxis

Pelvic Fracture

nonoperative

ABSTRACT

Introduction: Early initiation of thromboprophylaxis is highly desired in pelvic fracture patients, but it is often delayed due to the fear of hemorrhage. Aim of our study was to assess the safety of early initiation of venous thromboprophylaxis in patients with pelvic trauma managed nonoperatively.

Methods: Three-year (2010-2012) retrospective study of trauma patients with pelvic fractures who were managed nonoperatively and received thromboprophylaxis with low-molecular-weight heparin (LMWH). Patients were stratified in two groups based on the timing of initiation of prophylaxis; early (initiation within first 24 h) and late (after 24 h). Primary outcome measures included decrease in hemoglobin (Hb) levels, number of packed red blood cell (pRBC) units transfused, and the need for hemorrhage control (operative or angioembolization) after initiation of prophylaxis. Regression analysis was performed.

Results: 255 patients were included (158 in early and 97 in late group). Mean \pm standard deviation age was 48.2 ± 23.3 y, and 50.6% were male. After adjusting for confounders, there was no difference between the two groups in the decrease in Hb levels ($b = 0.087$, 95% confidence interval [CI] = -0.253 to 1.025 ; $P = 0.23$) or pRBC units transfused ($b = -0.005$, 95% CI = -0.366 to 0.364 ; $P = 0.75$). One patient required hemorrhage control postprophylaxis and belonged to the late group. Subanalysis of patients with signs of bleeding ($n = 52$) showed no difference between the two groups in the decrease in Hb levels or pRBC units transfused. Patients who received LMWH after 24 h had a higher incidence of symptomatic deep venous thrombosis and a longer hospital length of stay.

Quick-shot presentation at the 12th Academic Surgical Congress, February 2017, Las Vegas, Nevada.

* Corresponding author. Department of Surgery, Division of Trauma, Critical Care, and Emergency Surgery, University of Arizona, 1501 N. Campbell Ave, Room 5411, P.O. Box 245063, Tucson, AZ 85724, Tel.: +520 626-5056; fax: +520 626-5016.

E-mail address: bjoseph@surgery.arizona.edu (B. Joseph).

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<http://dx.doi.org/10.1016/j.jss.2017.06.049>

Conclusions: Early initiation of thromboprophylaxis with LMWH in patients with pelvic fractures managed nonoperatively is safe and decreases the risk of symptomatic deep venous thrombosis.

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Introduction

Venous thromboembolism (VTE), which comprises of deep venous thrombosis (DVT) and pulmonary embolism (PE), affects an estimated 900,000 people resulting in about 300,000 deaths annually in the US.¹ VTE is also a major source of potentially preventable morbidity and mortality in critically ill trauma patients.² DVT is estimated to occur in about 58% of severely injured trauma patients.³ Those patients undergoing major orthopedic surgery of the lower extremity represent the highest operative risk group for DVT and PE. The reported incidence of DVT after pelvic fractures varies greatly according to the patient's age, sex, comorbidities, type of fracture, and the methods used for detection and thromboprophylaxis of DVT.⁴ The literature shows that without prophylaxis, the incidence of DVT in such patients can be as high as 50%.⁵⁻⁷ The consequences of a trauma-related VTE may range from an asymptomatic DVT to a saddle-pulmonary embolus resulting in sudden cardiac death. In the literature, the mortality rate from a PE following a pelvic trauma varies between 0.5% and 10%. Likewise, it is estimated that approximately, 10% of hospital deaths can be attributed to PE.⁸ About one-third to one-half of lower extremity DVT patients develop post-thrombotic syndrome with chronic venous insufficiency, which is characterized by pain, inflammation, edema, skin necrosis, and ulceration.⁹ Furthermore, prolonged hospital stays for DVT or PE are a substantial cost burden to the US health care system.¹⁰

The recently published guidelines by the American College of Chest Physicians (ACCP) recommend the use of low-molecular-weight heparin (LMWH), fondaparinux, low-dose unfractionated heparin, or adjusted-dose-vitamin-K antagonists for a minimum of 10-14 d for the thromboprophylaxis of VTE in patients undergoing hip fracture surgery.¹¹ The ACCP recommends the use of LMWH for major trauma patients as soon as it is considered safe to do so. The Eastern Association for the Surgery of Trauma also recommends the use of LMWH for VTE prophylaxis in patients with pelvic fractures requiring operative fixation or prolonged bed rest.¹² Early initiation of pharmacologic thromboprophylaxis will prevent the VTE, but, in theory, it might also increase the risk of bleeding in patients with pelvic fractures. At the same time, however, delay in the prophylaxis may lead to DVT, which, in turn, may culminate into PE and even death. In spite of being a high-risk population for developing VTE complications, there is currently no consensus on the timing of initiation of thromboprophylaxis in pelvic fracture patients.

The aim of our study was, therefore, to assess the safety profile of the early initiation of venous thromboprophylaxis in patients with pelvic trauma managed nonoperatively. We hypothesized that there is no difference in hemorrhagic complications or the rate of intervention (operative and angioembolization) with the early initiation of VTE

prophylaxis compared to the late initiation in nonoperatively managed patients with pelvic trauma.

Methods

We performed a 3-year retrospective analysis of trauma patients with pelvic fractures presenting to our level-I trauma center from 2010 to 2012. This study was approved by the Institutional Review board (IRB), the University of Arizona who granted the waiver of consent for performing this study.

Inclusion and exclusion criteria

We included all adult patients (age > 18 y) with pelvic fractures who received thromboprophylaxis with LMWH during their hospital stay and were managed nonoperatively.

Patients transferred from other facilities as well as those with intracranial hemorrhage were excluded.

Study population

Our study population comprised of all adult pelvic fracture patients managed nonoperatively, who received VTE prophylaxis with LMWH 30 mg subcutaneously, every 12 h. The decision of timing of initiation of LMWH in patients with pelvic fractures was at the attending surgeon's discretion. We stratified the patients into two groups, early *versus* late; based on the timing of initiation of thromboprophylaxis. Early thromboprophylaxis was defined as LMWH therapy initiated within the first 24 h of admission. Late thromboprophylaxis was defined as LMWH therapy initiated after 24 h of admission.

Data points

Data points recorded for each patient include the following: patient demographics (i.e., age, sex, and race); mechanism of injury; vital parameters on presentation, including systolic blood pressure, heart rate, and the Glasgow Coma Scale (GCS) score; admission hemoglobin levels and then subsequently during the hospital stay; initial computed tomography (CT) scan findings; transfusion requirement; intervention for hemorrhage control, operative or angioembolization details; hospital and intensive care unit (ICU) length of stay (LOS); discharge disposition; complications, rates of symptomatic DVT and PE; and in-hospital mortality. The Injury Severity Score (ISS) was obtained from the trauma registry. We reviewed the pharmacy database for details about the VTE prophylaxis in each patient, including dose and time of administration of the drug.

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