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Original article

Evaluation of venous thromboembolic complications in patients operated on for pelvic fracture

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ABSTRACT

Introduction: Fractures of the pelvis (acetabulum and pelvic ring) are complex in both radiological diagnosis and therapeutic management. They show high-risk of thrombosis, with variable rates of venous thromboembolic complications in the literature, ranging from 10% to 50%, with 0.5–10% risk of fatal pulmonary embolism. The objective of the present study was to determine the rate of venous thromboembolic events in a consecutive cohort of pelvic fracture and to attempt to identify thromboembolic risk factors in this population.

Material and method: The study was based on a continuous retrospective series of 120 patients operated on between January 2015 and January 2017. Standard demographic data, clinical and diagnostic data for the fracture and the surgical approach were collected. Risk factors for venous thrombotic episodes were identified on Greenfield Risk Assessment Profile items (age, BMI, cancer, history of venous thromboembolism, surgery time, transfusion, femoral venous catheter, associated fracture) to define groups with high or low thrombotic risk.

Results: There was a 5% rate of venous thromboembolic events, and 2.5% of pulmonary embolism including 1 causing intraoperative death. The Greenfield score usually applied in surgery to assess venous thromboembolic risk did not seem relevant in this population already at high-risk of venous thromboembolism. No additional independent risk factors were identified.

Conclusion: This is the largest cohort focusing on thromboembolic risk in pelvic fracture. The results refine rates reported in the literature. A prospective study, currently underway, should highlight risk factors so as better to prevent these complications.

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1. Introduction

Pelvic fractures involve the pelvic ring (sacrum, sacroiliac joint, iliac wing, obturator ring and pubic symphysis) and/or acetabulum. Diagnosis and treatment are complex [1]. They are often caused by high-energy trauma (road accidents, falls), and lead to major functional sequelae in young patients. Surgical management requires a high level of expertise.

Pelvic fractures incur a high-risk of venous thromboembolism (VTE), with variable prevalence reported to range between 10% and 50%, and a 0.5–10% rate of fatal pulmonary embolism [2–4]. There are no specific preventive guidelines for VTE events in pelvic fracture [5]. VTE risk factors in orthopedic surgery are included in the

Greenfield Risk Assessment Profile, a score used in multiple trauma (Table 1) [6]. Pelvic fracture is a major risk factor for thrombosis: 4 points on the Greenfield score, where scores > 10 represent high VTE risk. In view of the literature data and foreseeable risk in this population, preventive anticoagulation therapy should be initiated as soon as possible.

The aim of the present study was to determine the rate of VTE events in a consecutive cohort of patients operated on for pelvic fracture. Risk factors for VTE events were screened for.

2. Material and method

A single-center retrospective observational study included 120 consecutive patients operated on for pelvic fracture between January 2015 and January 2017.

The main study objective was to determine the number of pre- and postoperative VTE events: proximal or distal deep venous thrombosis and/or pulmonary embolism.

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Table 1
Greenfield Risk Assessment Profile.

	Points
Underlying conditions	
Obesity (BMI > 30 kg/m ²)	2
Malignancy	2
Abnormal coagulation factors at admission	2
History of thromboembolism	3
Iatrogenic factors	
Femoral central venous catheter <input type="checkbox"/> 24 h	2
Four or more transfusions in 24 h	2
Surgical procedure > 2 h	2
Repair or ligation of major vascular injury	3
Injury-related factors	
AIS chest > 2	2
AIS abdomen > 2	2
AIS head > 2	2
GCS score < 8 for > 4 h	3
Complex lower extremity fracture	3
Pelvic fracture	4
Spinal cord injury with paraplegia or quadriplegia	4
Age	
40–59 y	2
60–74 y	3
≥ 75 y	4

AIS: Abbreviated Injury Scale; BMI: body mass index.

The secondary objective was to identify risk factors for VTE events, based on the Greenfield Risk Assessment Profile [6], with scores > 10 representing high-risk [4,7,8].

2.1. Population

The inclusion criterion was surgery for pelvic fracture. Non-operated pelvic fractures were excluded.

2.2. Data collection

Data were collected from patients' computerized Dxcare files, and from a prospective database of patients admitted with pelvic fracture, under Keops software (SMAIO, Lyon, France).

2.2.1. Clinical data

Standard demographic data (age, BMI, smoking status, medical and surgical history) and trauma-related data (date of trauma, fracture diagnosis on the Letournel acetabular fracture classification [9], associated fractures, type and duration of transport for patients referred from other centers) were recorded.

Fracture diagnoses were categorized according to trauma severity and risk of retroperitoneal hematoma liable to induce pelvic vessel compression:

- high intra-pelvic hematoma risk: pelvic fracture with large displacement (tile B and C requiring open reduction) (Fig. 1); for acetabular fracture: 2-column, transverse, T, anterior column, anterior column plus posterior semitransverse, posterior column (Fig. 2);
- low intra-pelvic hematoma risk: pelvic fracture with only slight displacement (Fig. 3); for acetabular fracture: anterior or posterior wall (Fig. 4).

2.2.2. Data for thromboembolic risk prevention

History of VTE and preventive anticoagulation treatments (date of initiation and treatment duration) were recorded.

VTE prophylaxis was initiated systematically before admission to the department at the latest. Time to initiation was recorded when prophylaxis was not initiated in the initial center on the day of trauma.



Fig. 1. Tile C pelvic fracture with large displacement.



Fig. 2. 2-column fracture.

2.2.3. Perioperative data

Perioperative data comprised number of packed red blood cell units transfused during stay in the department; femoral venous approach; preoperative biological data (blood count, platelets, CRP, preoperative hemostasis), surgical approach (anterior, posterior or subcutaneous), and postoperative complications, including infection.

All patients followed the same postoperative protocol: early verticalization (day 1–2) with non-weight-bearing on operated limb, and resumption of full weight-bearing at postoperative day 45.

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