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Clinical Case Report **Medicine** OPEN

## Management of pulmonary embolism after recent intracranial hemorrhage

### A case report

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**Abstract**  
**Rationale:** Venous thromboembolism may result from prostatic immobilization following intracranial hemorrhage. Massive pulmonary embolism with associated right heart failure is life-threatening, requiring treatment with anticoagulants or even thrombolytic agents. However, these drugs are contraindicated after a recent hemorrhagic episode, as they may induce further hemorrhage. There are no guidelines for treatment in these circumstances.  
**Patient concerns:** A 57-year-old man experienced massive pulmonary embolism and shock 18 days after an intracranial hemorrhage.  
**Diagnoses:** Tachycardia and high D-dimer (21.27 mg/L, fibrinogen-equivalent units) were noted. Chest computed tomography showed bilateral pulmonary trunk embolism.  
**Interventions:** Heparinization was used and activated partial thromboplastin time therapeutic range was 50 to 70 seconds. Fortunately, shock status and shortness of breath improved two days later. Continuing high-dose Rivaroxaban was administered for three weeks.  
**Outcomes:** There was no recurrent intracranial hemorrhage (ICH) following treatment for three weeks with high-dose and one-year with standard dose of rivaroxaban. This report presents a treatment option in the management of these difficult clinical situations.  
**Lessons:** The combination of unfractionated heparin infusion and continuing non-Vitamin K antagonist oral anticoagulants use could manage life-threatening pulmonary embolism following recent ICH. Theoretically, the use of NOAC is a safer strategy if the patient with previous history of major ICH.  
**Abbreviations:** CT = computed tomography, DVT = deep vein thrombosis, ICH = intracranial hemorrhage, MC = inferior vena cava, LV = left ventricle, NOAC = non-Vitamin K antagonist oral anticoagulant, PE = pulmonary embolism, RV = right ventricle, UFH = unfractionated heparin, VTE = venous thromboembolism.  
**Keywords:** critical care, intracranial hemorrhage, non-Vitamin K antagonist oral anticoagulants, pulmonary embolism

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#### 1. Introduction

A treatment dilemma exists in patients who experience life-threatening venous thromboembolism (VTE) following recent severe brain injury. Clinicians must decide which anticoagulant to use in patients who have had a recent cerebral hemorrhage. We report a case of severe pulmonary embolism with right heart failure and shock following recent intracranial hemorrhage without surgical intervention. A strategy of unfractionated heparin infusion and non-Vitamin K antagonist oral anticoagulants (NOAC) was used with good outcome, and did not result in secondary hemorrhage events, or recurrent thromboembolism. All studies using NOAC for VTE and stroke prevention in patients with atrial fibrillation, showed a lower incidence of intracranial hemorrhage (ICH), than with heparin and warfarin.<sup>1,2</sup> Therefore, it is reasonable and safe to use NOAC to treat VTE in patients who have had a hemorrhage episode recently.

#### 2. Case presentation

A 57-year-old man experienced sudden onset of shortness of breath for several hours, requiring emergency intubation for impending respiratory failure with low oxygen saturation. Tachycardia and high D-dimer (21.27 mg/L, fibrinogen-equivalent units) were noted. Electrocardiography showed new

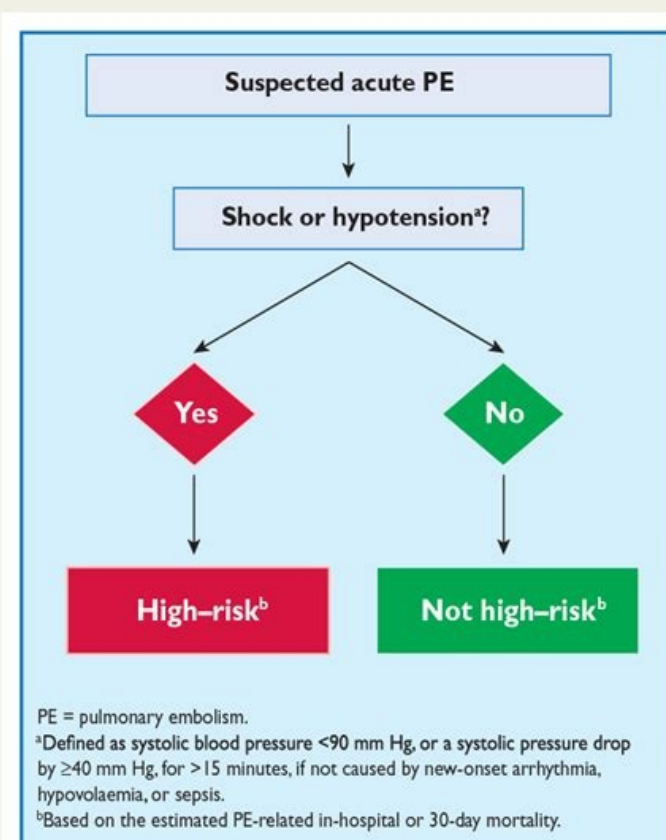
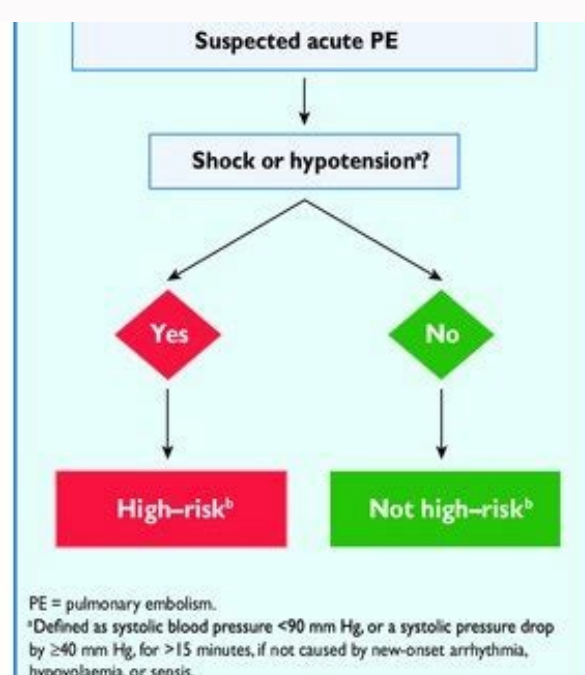


Figure 2 Initial risk stratification of acute PE.

Classes of recommendations	Definition	Suggested wording to use
<b>Class I</b>	Evidence and/or general agreement that a given treatment or procedure is beneficial, useful, effective.	Is recommended/is indicated
<b>Class II</b>	Conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of the given treatment or procedure.	
<b>Class IIa</b>	Weight of evidence/opinion is in favour of usefulness/efficacy.	Should be considered
<b>Class IIb</b>	Usefulness/efficacy is less well established by evidence/opinion.	May be considered
<b>Class III</b>	Evidence or general agreement that the given treatment or procedure is not useful/effective, and in some cases may be harmful.	Is not recommended





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