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Original Research Article

Pulmonary Thromboembolism Related to Complicated Knee Surgery. Initial Hospital Treatment and 1 Year Follow Up (Case Report)

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Abstract

Introduction: Pulmonary thromboembolism (PTE) and Deep vein thrombosis (DVT) are common complication following any type of surgery. Orthopedic surgeries have a risk higher than 10% of developing PTE. Therefore, a 2 to 5 weeks is given after the surgical procedure. ***The Aim:*** of this study was to present a case of PTE, preceded by local DVT, preceded by orthopedic surgery despite of prophylaxis with 4000 I.U of LMWH for 21 days and the 1year outpatient follow up afterwards. ***Materials and Methods****:* A full clinical analysis of a 20 years-old male athlete treated for PTE, DVT and Pleuropneumonia from 22.06.2024 to 05.07.2024 in inpatient setting and a follow up treatment in outpatient setting for 1 year. ***Results:*** The patient was admitted with d-dimer count of 3900ng/L, S1Q3T3 ECG pattern highly suspected of underlying PTE. What followed was 2 week long inpatient treatment and stabilization and 1 year-long outpatient treatment, evaluation and finally permanent discontinuation of anticoagulant therapy. ***Discussion:*** In an inpatient setting the treatment with LMWH is safer than any other type of anticoagulation for PTE when the right conditions are met and no imminent hemodynamic instability is present. DVT and PTE remain common complications of surgeries especially orthopedic ones. ***Conclusion:*** This case highlights the importance of circulatory complications related to surgeries, especially orthopedic ones and how sometimes the given prophylaxis can fail.

Keywords: Pulmonary thromboembolism, post-surgical complications.

1. INTRODUCTION

Venous thromboembolism (VTE) encompasses deep-venous thrombosis (DVT) and pulmonary embolism (PE) and causes cardiovascular death, chronic disability, and emotional distress. Hospitalizations in the United States have decreased for acute myocardial infarction (MI), heart failure, and stroke among Medicare beneficiaries, but PE hospitalizations increased. Pulmonary Embolism Mortality PE-related mortality in the United States decreased from 6 per 100,000 in 2000 and plateaued at approximately 4.5 per 100,000 in 2017. In contrast, Europe's age-standardized annual PE-related mortality rate has continued to decrease linearly since 2000. In the United States, PE-related mortality is increasing among young and middle-aged adults. Consequently, the median age at death from PE decreased from 73 years in 2000 to 68 years in 2018. During this period, the annual PE mortality was up to 50% higher in African Americans compared with Caucasians. [1] Patients undergoing orthopedic surgery have an increased risk for deep venous thrombosis (DVT) and pulmonary embolism (PE). These complications are considered detrimental, as they cause major postoperative morbidity and mortality and lead to a substantial health care burden. Because of the high incidence and serious nature of these complications, it is essential for orthopedic surgeons to have a comprehensive knowledge of the risk factors, diagnosis, and treatment of acute DVT and PE. Perioperative management of orthopedic patients to prevent postoperative DVT and PE and optimize postoperative outcomes is also discussed in this review. [2] Long-Term Sequelae of Pulmonary Embolism With respect to quality of life, about half of PE patients report persistent dyspnea, fatigue, and reduced exercise capacity, and about one-quarter have persistent right ventricular dysfunction on echocardiogram. This constellation of findings is being recognized more frequently and is called the "post-PE syndrome" A less frequent complication of PE is the development of chronic thromboembolic pulmonary hypertension (CTEPH),

which usually causes breathlessness, especially with exertion. [3,4]

2. The aim of this study was to present a case of PTE, accompanied by local DVT, preceded by surgical treatment of fracture in the knee, despite of prophylaxis with 4000 I.U of LMWH for 21 days

3. MATERIALS AND METHODS

A full clinical analysis of a 20-year-old male (professional athlete) patient treated for PTE, DVT and Pleuropneumonia from 22.06.2024 to 05.07.2024 in our department, following a surgery performed 1 month prior. As well as out-patient follow up for 1 year.

4. RESULTS

4.1 Background:

The patient being a professional athlete suffered a sport related injury (Luxation of the patella accompanied with abrasion fracture of the medial condyle of the right femur and a rupture of the lateral and medial collateral ligament) which required surgical treatment. The operative treatment was with no acute complications as well as the hospital stay on the traumatology department. The patient was discharged with 0,4 U.I of Enoxaparin for subcutaneous use in the next 14 days and with a recommendation for verticalization and stress- free exercises. After the hospitalization the d-dimer remain relatively high peaking around 3000 while on anticoagulation prophylaxis and reaching 900 at best. After 21 days the anticoagulation prophylaxis was discontinued. Seven days after that the d-dimer peaked again at 3900, with dyspnea, increased inflammatory markers and left sided flank pain. Due to changes in the ECG, chest pain and now pleuropneumonia the patient was referred to us for further diagnostics.

4.2 Clinical Presentation:

On arrival the patient was tachycardic, dyspneic with left sided flank and chest pain. Auscultation noted reduced breath sounds on the left lower lobe. There was visible and painful swelling on the popliteal fossa where the surgical procedure was done 1 month ago. This gave us a suspicion for a possible deep vein thrombosis associated with surgery.

4.3 Diagnostic Procedures:

The patient was admitted with d-dimer count of 3900ng/L, S1Q3T3 ECG pattern, having an ongoing pneumonia, painful swelling of the popliteal fossa and with a recent orthopedic surgery he was at high risk of having PTE. The following day a PTE protocol CT was performed confirming the diagnosis. Having confirmed the diagnosis via CT, a lower limb doppler ultrasound was preformed, showing a total occlusion of the right femoral vein giving us a confirmation of DVT. A vascular surgeon was consulted after the DVT confirmation, who suggested a conservative treatment with LWMH.

4.4 Hospital Treatment:

On admission, treatment with a dose of 2x8000 I.U of LMWH was started. During the treatment the patient was regularly evaluated for hemostasis, d-dimer and anti-Xa and after 2 weeks there was a clinical and hemostatic improvement and the patient was discharged with oral therapy of 2x15mg Rivaroxaban for 10 days and with a suggestion to perform a new lower limb doppler and hemostatic evaluation after the 10 days oral treatment for dose adjustment of the NOAC. The patient also had a consolidation of parenchyma that was symmetrical with the infarction zone of the pulmonary embolism with a consequent mild pleural effusion. This was evaluated regularly with lung ultrasound, treated with antibiotics and on discharge was with nearly full resolution.

4.5 Outpatient Follow up and Treatment:

After the hospitalization the first outpatient evaluation took place after 3 weeks. The patient consulted with a new report of d-dimer and hemostasis which were withing range. A control CT was scheduled and a control low extremity doppler ultrasound. On the follow up ultrasound there was no recanalization on the right femoral vein and on the right popliteal vein. The CT showed mild filling defects who were highly suspected of micro embolisms but with a regression compared to the CT on admission. Having no satisfactory outcome with this NOAC we decided to switch the patient to Apixaban 5mg twice daily. After 2 mounts of treatment there was an improvement in the doppler ultrasound with a full recanalization of the right popliteal vein and 15cm recanalization of the right femoral vein. In the meantime, a vascular surgeon was consulted again and recommended to continue with the conservative treatment. The doppler ultrasound was repeated after 2 weeks with nearly full recanalization this time with only 2,5cm left uncompressible. The following year the doppler ultrasound was repeated twice with a gap of 10 mounts with no complications of the deep veins and no acute or chronic embolisms. A specialist for transfusion medicine suggested the anticoagulation therapy to be fully discontinued after 18 months.

5. DISCUSSION

When the given anticoagulant prophylaxis fails, factors like: age, BMI of the patient, dosage and duration of the prophylaxis, comorbidities, post-surgical management and rehabilitation should be considered and evaluated.[5] Once a PTE or DVT is diagnosed, an anticoagulation therapy must be undertaken by the physician. The decision for an inpatient or outpatient approach depends on the physician if the patient is clinically and hemodynamically stable. [6] In our case, even though the patient was clinically stable we decided for a hospital treatment because it was a person of young age, with a profession that requires full cardiopulmonary

recovery in order to be fit for practicing it in the future and a full diagnostic evaluation which is faster and cheaper if done in an inpatient setting.[7,8] Having these two-diagnosis confirmed requires a doppler ultrasound follow-up regularly in order to evaluate the efficiency of the anticoagulation therapy and if needed as in our case to switch the medication protocol or consider a surgical intervention. [9,10] Once the condition is resolved, it is important to clarify if the risk factor was provoked or unprovoked to decide about the discontinuation of the anticoagulant therapy. [11]

6. CONCLUSION

DVT and PTE remain common complications after any type of surgery, despite the given prophylaxis and should be considered and treated when dealing with this risk group of patients. The follow up with pulmonary CT angiography and doppler ultrasound is mandatory for evaluating the efficiency of the anticoagulation therapy given.

7. Disclosure: A preliminary version of this article was presented at the 2nd International Marcus Aurelius Scientific Research Congress April 2026 in Ankara Türkiye.

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