Case Report

# Deep Venous Thrombosis and Pulmonary Embolism After Knee Arthroscopy in Athletes Carrying the Thrombophilic Factor Lupus Anticoagulant

Enrico Pola, M.D., Ph.D., Andrea Flex, M.D., Pierangelo Papaleo, M.D., Eleonora Gaetani, M.D., Antonio Delcogliano, M.D., and Paolo Pola, M.D.

**Abstract:** In patients undergoing arthroscopic knee surgery, deep venous thrombosis and pulmonary embolism are rare and there is not clear indication as to the necessity of thromboprophylactic treatment in these patients. However, the role of coagulation disorders in thrombotic events following arthroscopy is unknown. We report 2 cases of massive deep venous thrombosis and pulmonary embolism after knee arthroscopy in athletes carrying the thrombophilic factor lupus anticoagulant, but with no personal or familial history of thrombotic diseases. A few days after the arthroscopic intervention, both patients presented with deep venous thrombosis and 1 developed a severe pulmonary embolism. Blood examination showed that both athletes were lupus anticoagulant–positive. This is the first description of an association between venous thromboembolism, knee arthroscopy, and a prothrombotic condition. This report suggests that screening for hypercoagulability might be useful in athletes undergoing even minimally invasive orthopaedic surgery and that in cases of venous thromboembolism after knee arthroscopy, a prothrombotic disorder should be suspected.
**Key Words:** Deep venous thrombosis—Pulmonary embolism—Knee arthroscopy—Thrombophilia—Lupus anticoagulant—Athletes.

Deep venous thrombosis (DVT) and pulmonary embolism (PE) are severe and potentially life-threatening complications of major orthopaedic surgery. The postoperative incidence rate of DVT varies from 40% to 70% in the absence of antithrombotic prophylaxis.[1,2] In contrast, the risk of DVT and PE in subjects undergoing minimally invasive orthopaedic surgery, such as knee arthroscopy, is still unclear.

*From the Departments of Orthopaedics (E.P., A.D.) and Internal Medicine and Angiology (A.F., P. Papaleo, E.G., P. Pola), A. Gemelli University Hospital, Università Cattolica del Sacro Cuore School of Medicine, Rome, Italy.*

*Address correspondence and reprint requests to Enrico Pola, M.D., Ph.D., Istituto di Ortopedia e Traumatologia, Policlinico A. Gemelli, Università Cattolica del Sacro Cuore, L.go A. Gemelli 8, 00168 Rome, Italy. E-mail: enricopola@hotmail.com*



*0749-8063/05/2101-4185$30.00/0*

*doi:10.1016/j.arthro.2004.09.028*

Lupus anticoagulant (LAC) is an antiphospholipid antibody characteristic of the antiphospholipid syndrome, a multisystem disease with the predominant features of arterial and venous thrombosis, as well as recurrent thromboembolism.[3] LAC reacts against several components of platelets, red blood cells, and endothelium, and is currently recognized as one of the leading causes of acquired hypercoagulability.[4] The thrombotic risk in patients with antiphospholipid syndrome is especially increased during surgery, prolonged immobilization, or traumatic events.[5]

In this report, we describe the cases of 2 LAC-positive patients with no personal or familial history of thrombotic diseases in whom DVT (in 1 case complicated by massive PE) occurred after arthroscopic treatment of cruciate ligament reconstruction and selective meniscectomy, respectively. To our knowledge, there are no reports in the literature of an association between DVT

and/or PE after knee arthroscopy and a recognized thrombophilic factor, such as LAC.

## CASE REPORT 1

A 45-year-old man presented with pain and functional limitation of the left knee after a traumatic injury during a soccer match. A meniscal lesion was suspected and the patient underwent arthroscopic treatment of selective meniscectomy and partial synovectomy, followed by antithrombotic prophylaxis with low–molecular-weight heparin. Physical rehabilitation with partial weight bearing while wearing graduated compression stockings on both legs was initiated immediately after surgery and the patient was discharged after 4 days.

One week later, he presented with edema and pain of the right leg. High-resolution B-mode ultrasonography of the venous system of the lower limbs revealed a massive thrombosis occluding the right femoral-popliteal axis and reaching the confluence of the deep femoral vein. The proximal end of the thrombus was only partially adherent to the vessel wall. Chest radiographic examination, electrocardiography, hemocoagulation tests, and complete hematochemical test results were all in the normal range. The patient was treated with intravenous sodium heparin with daily control of the value of activated partial thromboplastin time (aPTT), which was maintained in the therapeutic range (2 to 3 times higher than normal). A series of tests to identify the presence of a coagulation disorder was performed: protein C, protein S, activated protein C resistance, prothrombin G20210A mutation, homocysteine, antithrombin III (AT III), vitamin $B_{12}$, and folic acid levels were normal. In contrast, plasma level of the thrombophilic factor LAC was higher than normal: diluted Russell viper venom (dRVV) was 56.12 (normal range, 20 to 34) and dRVV ratio was 1.44 (normal range, 0.70 to 1.20).

Two days later, the patient had a syncopal episode. Pulmonary scintigraphy showed multiple perfusion defects of the left lung and the superior lobe of the right lung, consistent with PE. Spiral computed tomographic (CT) angiography showed the presence of a massive thrombosis of both main branches of the pulmonary artery, involving lobar and segmental ramifications, with bilateral pulmonary hypoperfusion, but no signs of infarction. The sizes of pulmonary artery and right ventricle were increased, whereas the right atrium and superior vena cava were normal. DVT was still present at the level of the right common femoral vein, but no evidence of thrombosis was found in the iliac veins and the inferior vena cava. A cycle of therapy with recombinant tissue plasminogen activator (rTPA) was performed in association with heparin infusion, and a filter was placed in the inferior vena cava below the renal veins.

Five days later, the filter was removed and the day after the patient underwent a new ultrasonographic evaluation of the venous system that showed a thrombosis of the inferior vena cava with almost complete occlusion of the vessel. Thrombosis had expanded again to the iliac veins, the left common and superficial femoral veins, the left popliteal vein, and the left posterior tibial veins. A new CT-angiography showed a reduction of the endoluminal defects in both pulmonary arteries. The end of the thrombus was not adherent to the vena cava wall, had an irregular aspect, and was located 1.5 cm above the confluence of the renal veins. Two new cycles of therapy with rTPA (100 mg in 60 minutes) were administered, with the goal of reducing the extension of the thrombus below the renal veins to allow for the positioning of a new filter into the vena cava. However, no reduction of the thrombotic process was obtained. Therefore, in consideration of the clinical severity of the situation, the patient underwent a procedure of mechanical thrombectomy, after positioning a temporary vena cava filter. The patient was then treated with intravenous infusion of sodium heparin.

Four days later, a new high-resolution B-mode ultrasonography showed a complete recanalization of the iliac veins and inferior vena cava, with an initial recanalization of the superficial femoral vein and the popliteal vein. Heparin therapy was then substituted with a treatment with oral anticoagulants.

The presence of LAC is indicative of antiphospholipid syndrome. This disease may be idiopathic or secondary to neoplastic, autoimmune, and infectious conditions. Therefore, the patient was carefully evaluated in order to exclude the presence of one of these diseases. A total-body CT scan was carried out and did not detect any signs of tumor. In addition, plasma levels of tumor markers were all in the normal range. Several tests targeted to the identification of autoimmune or infectious diseases were negative as well. In conclusion, the patient was considered affected by an idiopathic LAC-positive antiphospholipid syndrome.

One week later the patient was discharged from the hospital in good general condition, but with a severe reduction in muscle tone of both legs and functional limitation of the operated knee. One year later, his general condition is good, but he is lame in his left leg, and can not engage in any kind of sporting activity.