

Akut pulmoner emboli ile başvuran orta riskli bir hastada, subklavyen ven yoluyla kateter aracılı ultrason ile tromboliz: Alternatif girişim yeri

Ultrasound-assisted, catheter-directed thrombolysis of acute pulmonary embolism via the subclavian vein: an alternative access path

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Özet– Kateter aracılı ultrason ile tromboliz (KAUT) sırasında kullanılan rutin venöz erişim yolu ana femoral vendir. Bu yazıda, ana femoral venlerde kronik tromboz sonucu iki tarafı tıkanma olan hastada subklavyen veni yolu ile yapılan başarılı bir KAUT olgusu sunuldu.

APE *Acute pulmonary embolism*
USAT *Ultrasound-assisted, catheter-directed thrombolysis*
NT-proBNP *N-terminal -probrain natriuretic peptide*

Acute pulmonary embolism (APE) is a potentially life-threatening clinical condition with a wide symptomatic spectrum. Alleviating effects of systemic thrombolytic treatments on hemodynamic parameters, and right ventricular functions in APE patients with hemodynamic instability have been already demonstrated. However, this treatment has an unwanted side effect profile predominantly intracranial bleeding. However in patients with moderate risk, beneficial effects of systemic thromboembolism in decreasing morbidity, and mortality have not been definitively established.

Since its side effects as major bleeding have not been demonstrated conclusively ultrasound-assisted, catheter-directed thrombolysis (USAT) has been started to be used increasingly in our country, and in the world. Routinely common femoral artery is used as a venous access route during USAT.

In this paper a successful case of USAT performed through subclavian vein in a patient who had occluded bilateral common femoral arteries secondary to chronic thrombosis was presented.

Summary– Routinely, the common femoral vein is used for access in ultrasound-assisted, catheter-directed thrombolysis (USAT). A case of bilateral femoral venous occlusion caused by chronic thrombosis, successfully treated with USAT, using subclavian vein access was presented.

CASE PRESENTATION

A 65-year-old male patient who was using warfarin because of recognized diagnosis of deep vein thrombosis applied to emergency service with sudden onset of dyspnea, and hemoptysis. On his physical examination arterial blood pressure was 100/60 mmHg, and pulse rate 105 bpm. On basal region of his right lung, rales, and over tricuspid focus 3/6 pansystolic murmur were auscultated. His laboratory parameters were as follows: serum creatinine level, 1 mg/dl; WBC, $2 \times 10^3/\text{mm}^3$, serum troponin I, 0.1 ng/ml; and NT-proBNP, 385 pg/ml. Echocardiography revealed right ventricular dilatation, and his systolic pulmonary artery pressure was 80 mmHg, TAPSE was measured as 1.4 cm. His pulmonary artery computed tomography angiography disclosed a thrombus which led to partial occlusion of pulmonary artery (Figure 1). On computed tomograms the ratio between the diameters of right and left ventricles was calculated as 1.2. Because of the presence of right ventricular dilatation, increased NT-proBNP levels without clinical manifestations of hypotension, and shock the patient was considered in moderate-high risk group.

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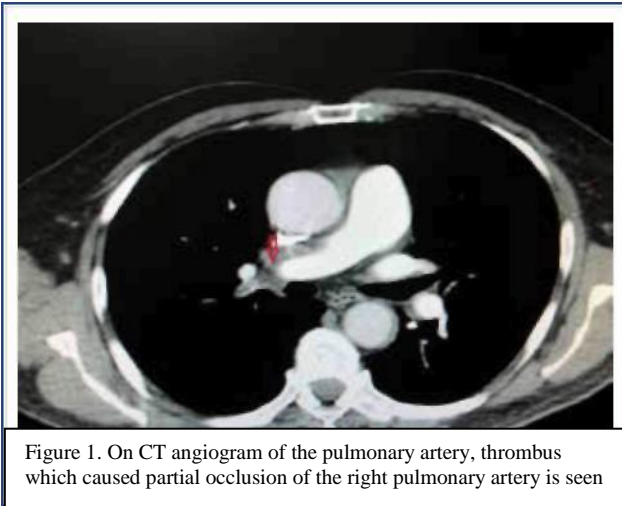


Figure 1. On CT angiogram of the pulmonary artery, thrombus which caused partial occlusion of the right pulmonary artery is seen

Since the patient was using oral anticoagulants, instead of USAT, application of systemic thrombolytic treatment was deemed to be appropriate. As a routine procedure access into pulmonary artery through femoral vein was planned. Femoral vein was punctured, and guidewire was tried to advance with no avail. Then venography was performed which revealed bilateral venous occlusion (Figure 2). Afterwards, jugular venous intervention was attempted. However abnormal jugular vein anatomy was not negotiable, so central venous catheterization was achieved through subclavian vein access. Pulmonary artery was accessed by means of subclavian catheterization, and EkoSonic MACH4e endovascular EkoSonic MACH4e system (EKOS Corporation, Bothell, WA, USA) was implanted in the proximal segment of the right inferior pulmonary artery (Figure 3). Within the first 24 hours 10 mg rtPA was infused through ultrasound-guided catheter. Postprocedural echocardiography revealed regression of pulmonary artery pressure down to 30 mm Hg. Any postprocedural complication did not occur, so the patient was discharged with oral prescription of warfarin.

DISCUSSION

Acute pulmonary embolism can lead an asymptomatic course or a broad spectrum of clinical manifestations which may be potentially life-threatening.^[1] Three-month mortality rates were indicated as 17 % in International Cooperative Pulmonary Embolism Registry (ICOPER), and half of these rates was attributed to APE.^[2]

In APE patients with hemodynamic instability, prognosis is poor, and because of cardiogenic shock, and acute heart failure inpatient mortality rates are nearly 15 percent.^[3] Systemic thrombolytic treatment is recommended as Class 1, and evidence level B in current guidelines.^[4] In this group, thrombolytic treatment exerts favourable effects on hemodynamics, and right ventricular functions, unfortunately together with unwanted complications as intracranial bleeding^[5]

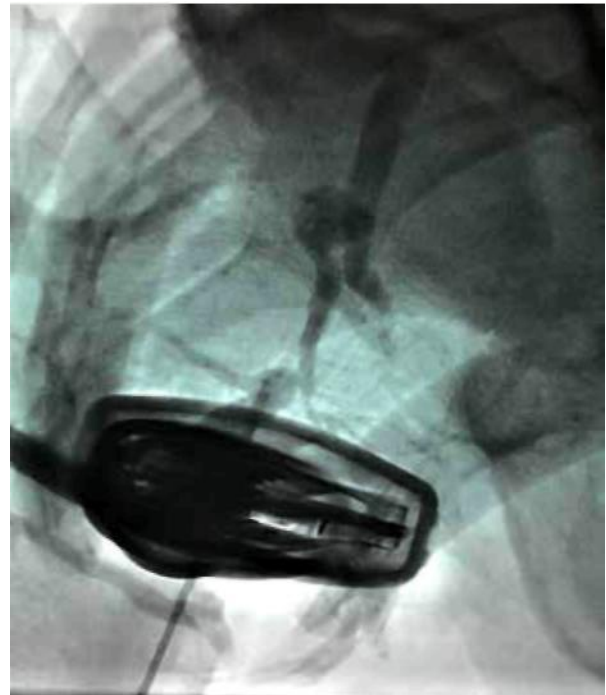


Figure 2. Occluded femoral artery

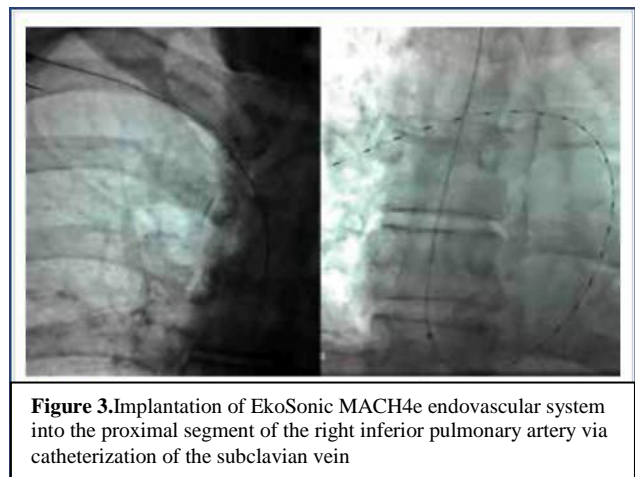


Figure 3. Implantation of EkoSonic MACH4e endovascular system into the proximal segment of the right inferior pulmonary artery via catheterization of the subclavian vein

Hemodynamically balanced patients with right ventricular dysfunction are included in the moderate risk group.^[4] In a multicentered PEITHO study which included 1006 patients, in APE patients with moderate risk, use of single doses of tenecteplase, and heparin regimen with placebo, and heparin therapy was compared.^[6] In this study, compared with the only heparin group, hemodynamic decompensation had been detected significantly less frequently in the tenecteplase group, however 7-30 day mortality rates had been found to be similar because of increased bleeding rates.^[6]

In this group systemic thrombolytic treatment is recommended as Class 2, evidence level of A in currently updated guidelines.^[4]

In APE patients with moderate risk, other treatment method is percutaneous catheter-directed treatment. In a study by Kucher et al. which included 59 patients, USAT, and unfractionated heparin therapy were compared in APE patients with moderate risk.^[7] In this study, a marked improvement in patients with right ventricular dilatation was detected in the USAT group relative to those who received heparin infusion, while severe bleeding rates were comparable.^[7] In current APE guideline, treatments by means of percutaneous catheterization in the moderate risk group is recommended as Class 2B, evidence level C interventions.^[4]

In studies investigating ultrasound-assisted, catheter-directed thrombolysis, common femoral vein had been preferred as a safer venous access route.^[7] The reasons of preferring common femoral vein include relatively lower incidence of bleeding, pneumothorax, and other complications when compared with other venous access routes.^[8]

According to the current guideline, our case is included in the moderate-risk group because of right ventricular dilatation, and higher NT-proBNP levels. Since the patient was using oral anticoagulants, systemic thrombolysis carried a relative contraindication, and clinic manifestations of APE emerged under oral anticoagulant treatment which led us to prefer USAT. Bilateral chronic thrombosis in femoral arteries of the patient was detected, so the catheter was directed into pulmonary artery using subclavian access. Access through subclavian vein is more difficult relative to common femoral artery access, and it is more prone to complications.^[8] Our patient had a higher tendency to develop hemothorax, and if pneumothorax evolved its management would be more troublesome. Besides, pulmonary artery cannulation is easily achieved through femoral vein access with the aid of a right Judkins catheter. However manual manipulation of the catheter is more challenging when subclavian vein access is used.

Despite increase in complications, and technical difficulties, as is shown in our case subclavian vein provides an alternative access route for USAT.

Our case demonstrates that in cases where other access routes are not available catheter-assisted thrombolysis through subclavian vein can be an alternative approach.

Conflict of Interest: None declared.

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Keywords: Acute pulmonary embolism; subclavian vein; ultrasound-assisted catheter-directed thrombolysis.