



# Catheter-Related Thrombosis and Fibrin Sleeve in a Pediatric Oncologic Patient: The Importance of Obtaining a Differential Diagnosis before Catheter Removal

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## Clinical Image

Dear Editor we would like to discuss the case of a young 14-year-old patient with acute myeloid leukemia treated in our hospital. The patient received a 5 French power injectable catheter (PYG) implanted in the right anonymous vein for the administration of chemotherapeutics. The positioning was performed according to the ISAC-Ped bundle developed by GAVeCeLT (The Italian Group for the Study of Long-Term Central Venous) for minimize the risk of infectious and mechanical complications as the result of the placement of a VAD (Vascular Access Device). After 2 months of chemotherapy treatment the patient developed a fever with negative blood cultures that were not responsive to two lines of antibiotic therapy. A transthoracic echocardiogram was performed and showed the presence of a thin hyperechogenic formation in the superior vena cava with a diameter of 3 mm and a length of 30 mm, probably attached to the catheter; the tip of the catheter was correctly positioned near the cavo-atrial junction. The catheter removed by a second party unaffiliated with a new transthoracic echocardiography, which confirmed the presence of the hyperechoic filiform formation starting from the superior vena cava and terminating in the right atrium. A new placement of a central venous catheter was required to allow the resume of chemotherapy; it was decided to insert the catheter in the right femoral vein with the tip positioned in the inferior cava vein. The inferior cava vein was preferred over the cervical thoracic veins there was suspicion of Catheter-Related Thrombosis and by the lack of a differential diagnosis between thrombosis and a fibrin sleeve caused by the catheter. The Catheter-Related Central Venous Thrombosis, infact, is a pathological and dangerous condition as result of a vessel injury caused by a catheter, more often when the ratio between the diameter of the VAD and the vessel is not respected, when the tip of the catheter is not positioned in the right cavo-atrial junction (short catheter) or when drugs are infused in a small vessel depleting the endothelium. Many congenital and acquired conditions are involved in the genesis of a Catheter-Related Thrombosis and the use of a safe insertion bundle for the insertion of a VAD is the first step to minimize the risk [1]. The fibrin sleeve or "fibrin sheath" is the unavoidable result of the insertion of a VAD in a vessel and consist in a floating sleeve of fibrin containing fibrinogen and corpuscular elements as the result of the blood coagulation process. The fibrin sleeve not represents a contraindication to the insertion of a new VAD in the vessel instead the thrombus is, of course, a risk factor for the complex mechanisms involving the wall of the vessel

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**Figure 1:** The FICC (femoral inserted central venous catheter) 5 Fr (PYG) inserted in the right femoral vein with the exit site on the anterior part of the thigh.

and the possibility of emboli that the new catheter could contribute to generate with the break off of the thrombus (Figure 1). When there is the suspicion of Catheter-Related Thrombosis it is mandatory to investigate for thrombus formation and obtain a differential diagnosis between thrombosis and a fibrin sleeve catheter related. The first step in the diagnosis is understand the probability of a thrombosis in the patient considering congenital factors, the therapy to which they have been subjected and the acquired factors, such as the insertion of a new VAD. Various types of studies, including CT, ultrasound and x-rays can be diriment in this differential diagnosis. The linogram is probably one of the first exams to perform as it shows the performances of the catheter and its relationship with the fibrin sleeve during the infusion of the contrast liquid. The transesophageal or transthoracic Doppler echocardiography are the gold standard for diagnosis of thrombosis with a specificity of 100% and a sensibility of 56% but when this test is negative the use of TC or the magnetic resonance is mandatory to obtain more information about the Catheter-Related Thrombosis [2,3]. In conclusion the removal of a catheter is an important decision with critical consequences for the health of the patient, and even more

so in a pediatric oncologic patient if we consider the interruption of the therapy and necessity of a general anesthesia every time we need to insert a new VAD. Finally it is our opinion that it is a necessity to obtain a differential diagnosis between a fibrins sleeve and a Catheter-Related Thrombosis to help the clinicians in the decision of which vessel to use for a new VAD.

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