

# Retroperitoneal Tunneled Hemodialysis Catheter in Inferior Vena Cava: A Report of Three Cases

## *Inferior Vena Kavaya Retroperitoneal Tünelli Hemodiyaliz Katateri: Üç Hastalık Olgu*

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### Keywords

Chronic renal failure, emergency hemodialysis, tunneled catheter

### Anahtar Kelimeler

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### Abstract

Finding an appropriate vascular access is difficult in long term hemodialysis patients for emergency hemodialysis. The aim of this study was to present tunneled hemodialysis catheter placement to inferior vena cava through retroperitoneal approach as an alternative method for patients who have emergency hemodialysis and no other choice. We placed tunneled hemodialysis catheter into inferior vena cava through retroperitoneal approach in three patients for emergency hemodialysis, two of them being female and one being male. The mean age of the patients was 51.3 years (min: 36, max: 56) and mean dialysis time was for a period of 4.3 years (min: 2, max: 6). In conclusion, placement of tunneled hemodialysis catheter into the inferior vena cava through retroperitoneal approach can be an alternative vascular access procedure for patients especially who have emergency hemodialysis and no other choice.

### Öz

Uzun süre hemodiyalize giren hastalarda acil hemodiyaliz için yeterli damar giriş yolu bulmak zordur. Biz bu çalışmada acil hemodiyalize girecek olan başka bir seçeneği olmayan hastalarda alternatif bir metod olan retroperitoneal yaklaşımla inferior vena kava'ya tünelli hemodiyaliz katateri yerleştirilmesini göstermeyi amaçladık. İki kadın, bir tanesi erkek olan üç hastaya retroperitoneal yaklaşımla vena kava inferiora tünelli hemodiyaliz katateri yerleştirdik. Hastaların ortalama yaşı 51,3 (min: 36, maks: 56), ortalama diyaliz süresi 4,3 yıl (min: 2, maks: 6) idi. Sonuçta retroperitoneal yaklaşım ile vena kava inferiora tünelli hemodiyaliz katateri yerleştirilmesi özellikle acil hemodiyalize girecek ve başka bir seçeneği olmayan hastalarda alternatif bir damar giriş yolu olabilir.

### Introduction

Finding an appropriate vascular access is difficult in long term hemodialysis patients for emergency hemodialysis. Tunneled hemodialysis catheter (THC) is a common and highly effective means of administering temporary venous access for dialysis for periods

longer than three weeks (1). THC inserted through a central vein is a useful way for these patients. Commonly, catheterization of the right jugular vein is the first choice (2). Subclavian and femoral veins are also used. Long term hemodialysis requires multiple interventions to central veins, causing thrombosis. Particularly in this group of patients, alternative interventions for vascular access are required. The aim of this study was to present THC placement to inferior vena cava (VCI) through retroperitoneal approach as an alternative method for emergency hemodialysis.

## Case Report

### Patient Selection

Patients who have bilateral occlusion of the jugular veins or subclavian veins, occlusion of the superior vena cava or chest wall abnormalities may be canalized for translumbar catheter placement (3). Patients who have morbid obesity and with stomas or open abdominal walls may be poor candidates for translumbar approach (4).

We placed THC into VCI through retroperitoneal approach in three patients for emergency hemodialysis, two of them being female and one being male. The mean age of the patients was 51.3 years (min: 36, max: 56) and mean dialysis time was for a period of 4.3 years (min: 2, max: 6). The patients were operated between December 2011 and June 2013. Past medical history of the patients revealed peritonitis due to peritoneal dialysis. All patients had previous bilateral upper extremity radiocephalic and brachiobasilic arteriovenous fistulas which had failed. Following the failure of the fistulas, THC was placed in right and left jugular veins in all patients. Before the operation, venous Doppler ultrasonography was performed in all patients for both upper extremities and lower extremities. All patients had bilateral jugular and subclavian vein thrombosis. Two patients had venous thrombosis in one of the lower extremities.

### Operative Technique

All patients were operated under general anesthesia with endotracheal intubation. Right retroperitoneal exposure was used to access VCI. VCI was secured by silastic tapes proximally and distally. Systemic 5000 IU unfractionated heparin was applied intravenously. Purse string suture was placed on the VCI. A 19 Fx32 cm silicone double-lumen THC was inserted through

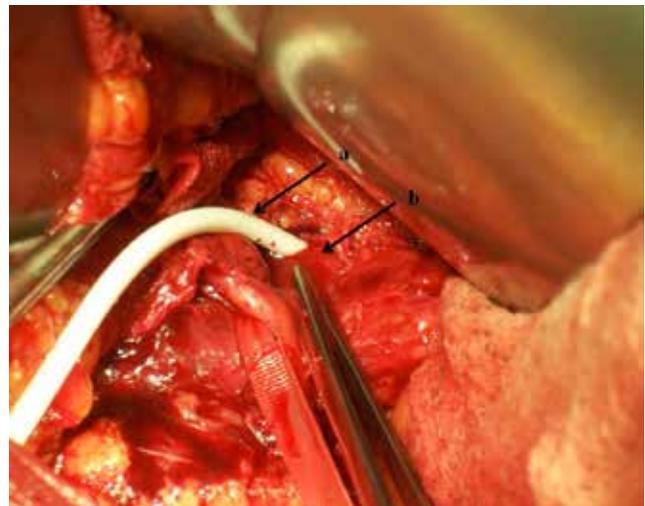
previously prepared tunnel (Figure 1). After insertion of catheter, the purse string suture was tied. A closed suction drain was placed in the retroperitoneal space. The retroperitoneal space was closed in the routine manner. The subcutaneous tissues and skin were closed with an absorbable suture.

### Postoperative Care

All patients were admitted to the postoperative intensive care unit. A single dose of prophylactic antibiotic (cefamezin) was administered. Patients received hemodialysis by the newly inserted catheter in the intensive care, when necessary. All patients were transferred to the surgical ward on the 2<sup>nd</sup> postoperative day.

### Discussion

To create an appropriate vascular access for patients undergoing long term hemodialysis is challenging. In this particular group of patients, alternative vascular access routes can be lifesaving. THCs, as described by Schwab et al. (5) for the first time, are used temporarily while patients have been waiting for fistula maturation, kidney transplantation or they are used for chronic vascular access (2). The dialysis outcomes quality initiative vascular access guideline recommends that no more than 10% of long-term hemodialysis access should be in the type of catheters (2). However, growing number of patients with long term hemodialysis require tunneled or non-tunneled central venous catheters due to increasing rates of thrombosis, vascular stenosis and infection (6-8).



**Figure 1.** a: Tunneled catheter b: inferior vena cava

In most patients, the right internal jugular vein is used more often than the left for central venous catheter. Access through the right internal jugular vein offers direct path to the right atrium, in contrast to the left internal jugular vein (9). The right internal jugular vein has the lowest risk of symptomatic central venous stenosis and thrombosis, and is technically easier to puncture using ultrasound guidance than any other central vein, with the exception of the femoral vein. Furthermore, thrombotic complications of the internal jugular vein catheters are usually asymptomatic because of the abundant network of collateral veins draining the head and neck (10).

Subclavian vein should generally be avoided for hemodialysis unless internal jugular access is unavailable. The subclavian vein has a number of unique disadvantages compared with the internal jugular vein, primarily because it provides venous drainage from the arm. Subclavian access is associated with high rates of stenosis and thrombosis (11). Subclavian vein puncture has the highest risk of pneumothorax and, if the puncture site is too far medial, catheter compression by the subclavius muscle-costoclavicular ligament complex may lead to fatigue and fracture, the so-called pinch-off syndrome (12,13). The subclavian vein should not be used in any patient requiring hemodialysis unless the ipsilateral extremity is unsuitable for synthetic graft or fistula creation.

Femoral vein catheterization is more prone to mechanical and infectious complications when compared to jugular and subclavian veins (14).

Conventional access sites provide satisfactory routes for catheter placement; a variety of options have been developed when they are no longer available for access because of thrombosis from multiple prior catheterizations. Lau et al. (15) described innominate vein catheterization. Moreover, percutaneous translumbar VCI, transsternal, transrenal, transhepatic venous access routes have been described (16-20). In one of our patients, multiple catheterizations, either permanent or temporary, were present in the past medical history together with thrombosis of bilateral jugular veins, subclavian and femoral vein. Numerous autologous arteriovenous fistulae (AVFs) and synthetic AVFs in both upper extremities had ended with failure. In the other two patients, while Doppler ultrasonography did not reveal any thrombosis in only

one of their lower extremities, catheterization failed. Catheterization through this region was present in the medical history. In order to meet the needs for hemodialysis in these three patients, THC was placed immediately into the VCI by the retroperitoneal approach.

The complications related to central venous catheterization may be classified under two groups: complications of device insertion and long-term complications. Complications of device insertion are pneumothorax, perforation, hemothorax and tamponade. Long term complications are infection, thrombosis, malfunction, compression, fracture and embolization (21). Our patients have been undergoing hemodialysis for a mean period of 10 months (min: 8, max: 12) without any complications.

In conclusion, placement of THC into the VCI through retroperitoneal approach can be an alternative vascular access procedure for patients especially who have emergency hemodialysis and no other choice. However, complications and catheter longevity should be taken into consideration.

#### **Ethics**

**Informed Consent:** We received consent from the patients.

**Peer-review:** Externally peer-reviewed.

#### **Authorship Contributions**

Surgical and Medical Practices: O.K., A.E., M.K., M.T., T.E., Concept: O.K., A.E., M.K., M.T., T.E., Design: O.K., A.E., M.K., M.T., T.E., Data Collection or Processing: O.K., A.E., M.K., M.T., T.E., Analysis or Interpretation: O.K., A.E., M.K., M.T., T.E., Literature Search: O.K., A.E., M.K., M.T., T.E., Writing: O.K., A.E., M.K., M.T., T.E.

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