



Surgical Implantation of a Cuffed Tunnelled Dialysis Catheter for Chronic Haemodialysis in the Inferior Vena Cava

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Abstract

In this article describes a case report of a direct catheterization of cuffed tunnelled catheter into Inferior Vena Cava in a patient with complete vascular access exhaustion for hemodialysis.

Keywords: Case report; Cuffed tunnelled catheters; Haemodialysis; Vascular access; Central venous

Introduction

The formation of an arterio-venous fistula (AVF) is a necessary operation for creating long – term vascular access for adequate dialysis, which affects the survival of patients suffering from CKD-V. Unfortunately, some patients, about 5%, develop inadequate fistula function for various reasons [1]. The lack of adequate vascular access limits the number of hemodialysis sessions and makes renal replacement therapy inadequate. If it is not possible to create a new fistula, implant dialysis catheters, and there are contraindications to peritoneal dialysis, it is possible to perform a transhepatic or translumbal puncture of the Inferior Vena Cava (IVC) as the last stage. Translumbal, transhepatic IVC vascular accesses are usually exclusive accesses that are considered less desirable due to the increased technical difficulty of catheter implantation, more frequent short - and long-term complications, or an increased risk of infections [2]. At the same time, certain skills of IVC puncture from the above-mentioned accesses and the availability of special x-ray equipment are required. There is a report of implantation of a cuffed tunnelled dialysis catheter in the IVC through the iliac vein [3].

This article describes the successful implantation of a cuffed

tunnelled dialysis catheter directly into the inferior Vena cava by surgical means.

Case report

A 64 – year – old man was admitted to the Department of Transplantation with a diagnosis of type II diabetes, severe course, diabetic nephropathy, diabetic encephalopathy, diabetic neuropathy, distal type, sensory-motor form, CKD-V, condition on treatment with program hemodialysis, multiple attempts to form a permanent vascular access, thrombosis of the cuffed tunnelled catheter in the left femoral vein. He has been suffering from diabetes since 1979. In 1982, retinal detachment, the patient was almost blind. In 2001, an upper-middle laparotomy for pancreonecrosis. The operation was complicated by spilled purulent peritonitis, which is why laparotomy and lavash of the abdominal cavity were performed three times. Due to the development of CKD – V, treatment with program hemodialysis was started on 06.06.2015. The patient repeatedly attempted to form a permanent vascular access on the right and left forearm, and shoulder. However, due to an undeveloped venous network on the extremities, partial venous thrombosis on the forearm, severe atherosclerosis of the arteries,

the patient constantly had AVF thrombosis, which required 6 operations on the forearm and three operations using a vascular prosthesis. The patient was implanted three times with cuffed tunnelled catheters in the Central veins-the internal jugular and subclavian veins on the right, and twice on the left. Due to poor blood flow through the dialysis catheter and constant thrombosis of the latter, a cuffed tunnelled catheter was implanted in the left femoral vein on 01.07.2019. However, on 20.07.2019, there was a thrombosis of the femoral catheter, infection of the latter. An attempt to eliminate catheter thrombosis by inserting urokinase into the lumen of the catheter failed. The catheter was removed. 22.07.2019. A cuffed tunnelled catheter was implanted in the right femoral vein. 01.08.2019. cuffed tunneled catheter thrombosis on the right. Given the fact that the patient had a history of laparotomy three times in connection with spilled purulent peritonitis, implantation of a peritoneal catheter will be extremely dangerous for the patient because of the risk of developing the adhesive process. Therefore, it is not possible to perform peritoneal dialysis in this patient. Due to the inability to form A-VF, implantation of a cuffed tunnelled catheter in the Central veins, the extreme danger of implantation of a peritoneal catheter and the inability to perform

peritoneal dialysis for life reasons, it was decided to perform the implantation of a catheter in the IVC. On 09.08.2019, a tunnel dialysis catheter was implanted in the IVC in the area of bifurcation of the iliac veins. Retroperitoneal pararectal access was performed in the right iliac region. The right common iliac vein is highlighted. When the latter was opened, it was revealed that the vessel was partially thrombosed and it was impossible to conduct a conductor and a dialysis catheter. The IVC in the bifurcation region was highlighted. The lumen of the vein is opened. A tunnel catheter was inserted into the IVC to a depth of 20 cm. (Figure 1). The catheter was fixed to the IVC and aponeurosis of the rectus abdominis. The dragon cuff of the catheter was fixed to the aponeurosis oblique muscle of the abdomen and the catheter is brought to the front wall of the abdomen through the contraperture outwards (Figure 2). The catheter is passable and the blood flow rate is 245.0 ml / min. (Figure 3). Postoperative period without complications. 5 sessions of adequate hemodialysis were performed. Patient was entered home in satisfactory condition. With dynamic monitoring after 6 months, the patient's condition is stable. Be undergoing long-term hemodialysis through a tunneled catheter. Blood flow through the catheter is 245 ml/min.



Figure 1: R-graphy of the abdominal cavity. The arrow indicates a tunnel catheter located in the lumen of the Inferior Vena cava.



Figure 2: General view of the tunnel catheter placed on the anterior abdominal wall.

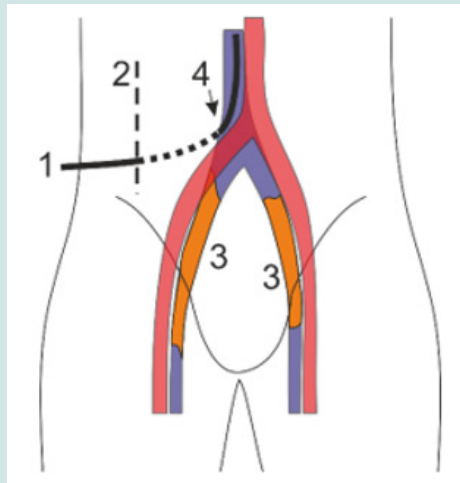


Figure 3: Diagram of the operation of implantation of a cuffed tunnel dialysis catheter in the Inferior Vena Cava. 1. cuffed tunnel dialysis catheter. 2. Pararectal incision on the anterior abdominal wall. 3. Thrombotic masses in the External Iliac Veins. 4. The arrow indicates the place of implantation of the cuffed tunnel catheter in the Inferior Vena Cava.

Discussion and conclusion

Insufficient blood flow through the AVF and dialysis catheter may occur in patients undergoing long-term hemodialysis treatment because of partial or complete Central vein thrombosis, suppuration, in patients with vascular disease, numerous previous attempts to create vascular access, and numerous concomitant diseases. The use of transhepatic and translumbal access to puncture the IVC can solve the problem of the quality of vascular access. However, some researchers do not recommend performing these accesses due to the low blood flow rate due to frequent catheter thrombosis [4]. According to Liu F et al. the survival rate of such catheters during 3,6,12 months is 43%, 25%, 4%, respectively. According to Moura et al. who performed a translumbal puncture in 12 patients, the adequate functioning of these catheters 3,6,12 months is 91%, 75% and 45%, respectively. The authors explain these best results by carefully monitoring the position of the catheter, correcting kinks, and immediately eliminating partial or complete thrombosis. The author believes that to achieve the best survival rate of any of the catheters and in particular translumbal necessary to control the tip of the catheter so it does not touch the wall of the vessel by fluoroscopy; avoid sharp bends in the catheter; control the patency of both venous and arterial ends of the catheter immediately after implantation [5]. During surgical implantation of a tunnel catheter in the IVC, all manipulations are performed under visual control. The place where the catheter is implanted is clearly visible. The course of the extravascular part of the catheter passes smoothly, without kinks. If the position of the catheter is not adequate, it can be easily corrected by changing the position of the catheter. In our case, an attempt was made to implant a catheter in the IVC through the proximal part of the right iliac vein. However, the latter was partially thrombosed. The guidewire couldn't pass this section of the vessel in the IVC. Then, the distal section of the

IVC was exposed at the confluence of the external iliac veins and the catheter was successfully implanted. When vascular access can't be created and there are contraindications for peritoneal dialysis, the only possible solution seems to be to use the IVC to access dialysis. There are reports of transhepatic and translumbal access, however, this requires expensive special computer equipment and highly qualified radiologists [6]. There are reports of access to IVC through the femoral vein, however, it is not always possible to conduct a guide in the case of complete or partial vein thrombosis.

In our opinion, implantation of a tunnelled dialysis catheter in an IVC allows immediate hemodialysis to begin, and this access can be used for a long term when none of the vascular accesses is possible.

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Communication to a society or meeting

This paper has no previous communication to any society or meeting.

Declaration of conflicts of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethics Committee

The study protocol was approval by local Ethics Committee and all participates patients gave written informed consent.

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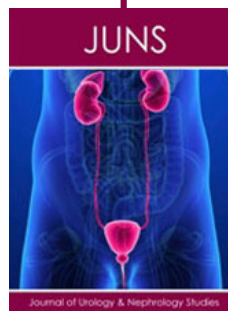
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