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Case Report

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Long-Term Use of Permanent Hemodialysis Catheter May Risk Patient's Life

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ABSTRACT

Double-lumen, tunneled (permanent) central venous dialysis catheters are frequently used in hemodialysis patients. Although less common than with temporary catheters, catheter-related infections can be an important problem. Therefore, care should be taken to avoid catheter use for longer than necessary. Here, we present a 30-year-old female patient, whose death was caused by recurrent infective endocarditis related with the long-term use of a hemodialysis catheter, in order to draw attention to the subject.

Keywords: Hemodialysis, infective endocarditis, permenant catheters

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INTRODUCTION

A healthy vascular access route is required for successful hemodialysis treatment in patients with end-stage renal disease (ESRD). In patients with ESRD, arteriovenous (AV) fistulas are the more frequently preferred methods because they provide the advantage of long-term use, and are safer in terms of complications. However, temporary or permanent (tunneled/felted) hemodialysis catheters may have to be preferred in acute renal failure patients who need hemodialysis treatment, and in chronic kidney failure patients who cannot achieve AV fistula. Although these catheters are advantageous because they can be installed in a short time and used immediately in emergencies, care should also be taken due to complications that may develop during insertion and use. Undoubtedly, one of the most important complications is a catheter-related infection. Sometimes, it can be treated easily, but sometimes, life-threatening complications such as infective endocarditis and sepsis can be encountered.[1,2]

In this case, we aimed to draw attention to the fact that long-term use of hemodialysis catheters could cause life-threatening complications, by presenting our patient whose prolonged use of a permanent hemodialysis catheter led to the development of recurrent infective endocarditis.

CASE PRESENTATION

A 30-year-old female patient, who developed ESRD secondary to systemic lupus erythematosus and hypertension, started hemodialysis treatment with a right permanent internal jugular dialysis catheter in October 2017. The patient did not want an AV fistula because she wanted to have a kidney transplantation from her father. However, the preparation for the transplant was prolonged because her father had diabetes mellitus without complications, and there were some problems requiring surgery related to prostate enlargement. During the hemodialysis session in December 2018, the patient had chills and a fever of 38°C. She was admitted

to the nephrology service and her tests were performed. In laboratory tests, WBC was measured as 4400/mm^3, Hb as 11.1 g/dL, CRP as 201 mg/L (0-5), and procalcitonin as 74 ng/mL (0-0.1). Catheter and blood cultures were obtained from the patient whose chest X-ray was normal. Linezolid 2 × 600 mg intravenous (iv) and meropenem 1 × 500 mg IV treatment were started; the catheter was removed due to the growth of methicillin-resistant *Staphylococcus aureus* in the blood cultures of the patient; and echocardiography was performed considering that the patient might have infective endocarditis. In echocardiography, vegetation with 14 × 7 mm stems on the aortic valve and thickening of the tricuspid valve were observed. A permanent jugular dialysis catheter was then inserted on the same side. After she was evaluated by the joint council of nephrology, cardiovascular surgery and infectious diseases departments, the current treatment was discontinued and iv vancomycin 1 × 1 g (every 72 hours) treatment was started. Because severe aortic insufficiency (3/4), perforation of the aortic valve secondary to infective endocarditis, and pericardial effusion with a diameter of 1.8 cm were observed in the control echocardiography of the patient who received vancomycin treatment for 2 weeks, aortic valve replacement was performed by the cardiovascular surgery clinic. The patient, who was followed up in the cardiovascular surgery clinic, was discharged after the regression of infection parameters. In the meantime, the patient was planned for the opening of an AV fistula, but the patient stated that she wanted to have a kidney transplantation and did not accept the procedure. In April 2019, the right permanent internal jugular dialysis catheter did not work, and was changed.

The patient, who was on hemodialysis 3 days a week, was admitted to the nephrology service in August 2020 because she had chills and a fever of 38°C during hemodialysis. Her blood analyses were performed. The patient's WBC was measured as 38 400/mm^3, Hb as 8.5 g/dL, CRP as 301 mg/L (0-5), and procalcitonin as 120 ng/mL (0-0.1). Catheter and blood cultures were sent for analysis. The patient was empirically started on iv vancomycin 1 × 1 g (every 72 hours) and meropenem 1 × 500 mg/day. She was taken to the internal medicine intensive care unit due to the development of hypotension and chest pain during the treatment follow-up. Norepinephrine treatment was initiated for hypotension. Methicillin-sensitive *Staphylococcus aureus* growth was observed in the blood culture of the patient. Considering that the patient might have infective endocarditis, echocardiography was performed. In echocardiography, the mitral valve fibrocalcific opening was slightly restricted, and rheumatic valve, mild mitral insufficiency, and aortic prosthetic valve ventricular surface with an image compatible with 1.1 × 1.9 cm mobile vegetation were observed. A 1.5 × 2.0 cm paravalvular abscess was seen adjacent to the aortic prosthetic valve and pulmonary artery. She was consulted to cardiovascular surgery and it was decided to reevaluate the patient after 1 week of antibiotic therapy. At the end of 1 week, laboratory tests were performed and the patient's WBC was measured as 41 400/mm^3, CRP as 143 mg/L (0-5), and procalcitonin as 309 ng/mL (0-0.1). In control echocardiography, the image of a mobile mass protruding in and out of the ventricular surface of the aortic prosthetic valve was observed. Compared to the previous echocardiography result, there was a reduction in the diameter of the mass, but the appearance of a 1.5 × 2.0 cm paravalvular abscess adjacent to the aortic prosthetic valve pulmonary artery continued. A decision to operate was made by the cardiovascular surgery clinic. The patient and her relatives refused the operation and she was discharged from the hospital at her own request. It was learned that the patient, who applied to another center, died without surgery.

Main Points

- Double-lumen, tunneled (permanent) central venous dialysis catheters are frequently used in hemodialysis patients.
- Although less common than with temporary catheters, catheter-related infections can be an important problem.
- Care should be taken to avoid catheter use for longer than necessary.
- When determining the indication for a permanent hemodialysis catheter, we should act more selectively and be insistent with the choice of AV fistula and graft for suitable patients.
- In patients who have to have the catheter for clinically preferred reasons, care should be taken in terms of avoiding infection.

DISCUSSION

The main problems related to venous catheters are infection, insufficient flow, thrombosis and central venous stenosis. Even in cases where the necessary precautions are taken at an optimal level, infections can be observed at much higher rates in venous catheters than AV fistulas. While infection is the leading cause of catheter loss, it can lead to an increase in morbidity and mortality.[1]

In the hemodialysis treatment process, the use of AV fistula for the purpose of vascular access is a desired and recommended method. According to the Turkey 2019 National Nephrology, Dialysis and Transplantation Registration System Report, as of the end of 2019, the distribution of prevalent HD patients according to the vascular access route currently used has been stated as AV fistula 76.51%, AV graft 1.16%, permanent catheter 20.27%, and temporary catheter 2.06%. Again, in the report, it has been emphasized that there has been a decrease in the rate of fistula use in recent years. It has been stated that this may be because of the difficulty of vascular access due to the increase in diabetic and elderly patients, and it has been suggested to prevent this situation from causing a permanent change in approach to the routine of the vascular access route.[3]

Sandroni et al. stated that the long-term use of catheters had only 2 indications: patients whose vascular access route could not be found, and those in the maturation process of newly opened fistula or graft. They stated that the reasons for use

other than these were optimistic reasons, and that it would be appropriate to avoid expanding the indications for catheter use, considering the risk of catheter-related infections and related endocarditis.[4]

Hoen et al.[5] stated that the most important risk factor for infective endocarditis in HD patients was the prolonged use of permanent catheters.

In our patient, a permanent hemodialysis catheter was used for longer than necessary. The patient was warned about this issue, but her desire to have a kidney transplantation was high and she was unlucky in finding a suitable donor, which made her resistant to this issue. Although the long-term use of a permanent catheter has to be applied to patients who have no chance of AV fistula in routine practice, continuing with a permanent catheter while there is a chance of AV fistula, especially in patients with a history of infective endocarditis, may lead to undesirable results.

As a result, when determining the indication for a permanent hemodialysis catheter, we should act more selectively and be insistent the choice of AV fistula and graft for suitable patients. In patients who have to have the catheter for clinically preferred reasons, care should be taken in terms of avoiding infection.

Informed Consent: Written informed consent was obtained from the participant who participated in this case.

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