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ARAŞTIRMA YAZISI / ORIGINAL ARTICLE

The Salvage Treatment of Accidentally Lost Tunneled Venous Catheters Using Existing Subcutaneous Tracts

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ABSTRACT

Objectives: Vascular access has prime importance in patients on hemodialysis. Tunneled dialysis catheter is one of the major types of vascular access. The most frequent tunneled hemodialysis catheter loss is due to infection and thrombosis of the catheter. Vascular access loss can be caused by accidental dislodgement of the catheter. The aim of this study was to evaluate the success rate of re-insertion of accidentally lost tunneled venous catheters using existing subcutaneous tracts.

Methods and Materials: This retrospective study included 35 patients who presented with inadvertent loss of tunneled hemodialysis catheter while on a chronic hemodialysis program. The study was conducted between 2010 and 2017. With the exception of 1 patient where the time elapsed was 3 weeks, the time from catheter dislodgement to insertion of a new catheter was a mean of 18±9 hours (range, 4–72 hours). The technique of allowing new catheter insertion via the existing subcutaneous tunnel is presented in this paper.

Result: The technical success of the re-insertion of tunneled HD catheters via existing subcutaneous tracks was achieved in all cases. No complications were observed during the process or follow-up period.

Conclusions: It was concluded that this technique has two main advantages compared to the re-insertion of the catheter to a new site. The first is that no complications were observed in any patients when the catheter was re-inserted through the subcutaneous exit site. The second advantage is that this technique takes less time, which makes the procedure more comfortable for the patient and decreases the need for sedation.

Keywords: Tunneled catheter, hemodialysis, central venous

KAZARA KAYBEDİLEN TÜNELLİ VENÖZ KATETERLERİN ESKİ SUBKUTAN TRAKT YOLUYLA KURTARILMASI

ÖZET

Amaç: Hemodiyaliz hastalarında vasküler erişim çok önemlidir. Tünelli diyaliz kateterleri en sık kullanılan vasküler erişim yollarından birisidir. Tünelli hemodiyaliz kateter kaybının en sık sebepleri enfeksiyon ve kateter trombozudur. Kateterin kazara çıkması vasküler erişim kaybının diğer önemli sebeplerinden bir tanesidir. Bu çalışmanın amacı tünelli kalıcı kateterini kazara kaybeden hastalarda mevcut subkutan tünel kullanılarak kalıcı kateterin kurtarılmasındaki teknik başarının değerlendirilmesidir.

Metot ve Materyal: 2010–2017 yılları arasında kronik hemodiyaliz programındaki 35 hastada kazara tünelli hemodiyaliz kateteri kaybedilmesi sonuçu mevcut subkutan yolla tünelli diyaliz kateteri yerleştirilen hastalar retrospektif olarak değerlendirildi. Geçen sürenin üç hafta olduğu bir hasta haricinde, kateter kaybı ile yeni bir kateter yerleştirilmesine kadar geçen süre ortalama 18±9 saat (4–72 saat aralığında) idi. Bu çalışmada mevcut subkutan tünel yolu kullanılarak yeni bir tünelli hemodiyaliz kateteri yerleştirilmesini sağlayan teknik sunulmaktadır.

Bulgular: Mevcut subkutan tünel yolu kullanılarak yerleştirilen hemodiyaliz kateterlerinde, teknik olarak tüm işlemlerde başarı sağlandı. Hastalarımızda işlem sırasında ve takiplerde komplikasyon gözlenmedi.

Sonuç: Tekniğimizin, tünelli diyaliz kateterinin yeni bir bölgeden yerleştirilmesine kıyasla iki temel avantajı olduğu sonucuna vardık. Birincisi, kateterin mevcut subkutan tünel yolundan yerleştirilmesi sırasında hastalarımızda hiçbir komplikasyonla karşılaşılmadı. İkinci avantajı ise tekniğimizin daha az zaman alması, prosedürü hasta için daha konforlu hale getirmesi ve sedasyon ihtiyacını azaltmasıdır.

Anahtar sözcükler: Tünelli kateter, hemodiyaliz, santral venöz

In patients on hemodialysis, vascular access has prime importance. There are three main vascular accesses for hemodialysis. These types are; arteriovenous fistula, arteriovenous graft and tunneled dialysis catheter (HD) (1). Temporary, non-tunneled hemodialysis catheters are used for short-term hemodialysis, where the duration is usually between several days and a few weeks. Long-term hemodialysis catheters are tunneled through a short subcutaneous route between the skin and the site of venous puncture. The American National Kidney Foundation recommends a tunneled dialysis catheter if a patient requires venous access for more than 3 weeks. At the skin exit site of tunneled lines, a cuff reduces infection rates and decreases the inadvertent removal of tunneled catheters compared to non-tunneled catheters (2). Compared with temporary catheters, tunneled catheters have significantly decreased the rates of malfunction, infection and thrombosis. Central venous catheter placement is a high-risk vascular procedure and requires strict aseptic conditions. Complications of long-term use of HD catheters include central venous stenosis, thrombosis and infection. In addition, early complications such as arterial puncture, hematoma and pneumothorax may also occur (3). Infection and catheter thrombosis are known as the most common causes of tunneled hemodialysis catheter loss; also accidental dislodgement of the catheter is one of the most seen causes of catheter loss. The aim of this study was to evaluate the success rate of the re-insertion of accidentally lost tunneled venous catheters using existing subcutaneous tracts.

Methods and Materials

This retrospective study included 35 patients (18 males and 17 females, mean age 60±19 years) who presented with an accidental loss of a tunneled hemodialysis catheter while on a chronic hemodialysis program. A technique that allows a new catheter insertion via the existing subcutaneous tunnel is presented in this paper. The study was conducted between 2010 and 2017. The catheters had been placed and working well for a mean of 8.3±5.4 months (range, 1–15 months). In 34 patients, the time from the accidental catheter removal to re-insertion was a mean of 18±9 hours (range, 4–72 hours) and in 1 patient with a left internal jugular vein tunneled hemodialysis catheter, the catheter had been lost 3 weeks previously. In 27 patients, the tunneled catheter was placed originally in the right internal jugular vein, and in 8 patients, in the left internal jugular vein via existing subcutaneous tracts. Before insertion of the catheter, all patients had their complete blood count, prothrombin time, and partial thromboplastin time checked. Patients with suspected infection symptoms such as hyperemia, induration, tenderness and/or purulent drainage in the tunneled track were excluded from the study and a new tunneled catheter was inserted with the standard procedure. All patients were prepared according to the standard surgical scrub protocol. Lidocaine was infiltrated subcutaneously along the expected course of the tunnel. Approximately 20 cc of local anesthetic is used in the conventional method of tunneled catheter insertion but in this study, approximately 5 cc of local anesthetic was used for tunneled catheter insertion. After administering the local anesthesia, a 5F or 6F dilator was introduced approximately several centimeters into the old tunnel skin entry site (Figure 1). The guide wire was navigated through the tunnel and advanced to the superior vena cava with the aid of the dilator. The tunneled catheter dilators were exchanged with the guide wire or stiff wire to obtain adequate tract dilatation. If resistance prevented catheter navigation through the tunnel, a peel-away sheath was introduced via the guide wire or stiff wire (Figure 2). After adequate dilatation, a new hemodialysis catheter was placed with the distal tip into the

Figure 1. a–c. 5F or 6F dilators were introduced into the old tunnel skin entry site **(a)**. The tunneled catheter dilators and peel away sheath **(b)**. Placement of the tunneled catheter via guide-wire **(c)**.

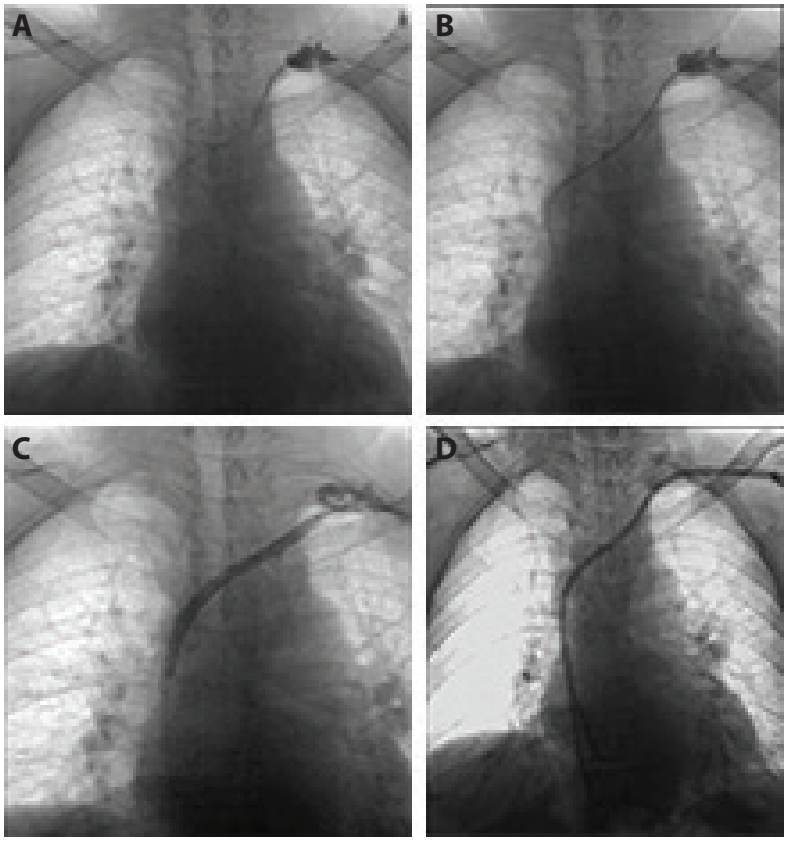

Figure 2. a–d. Sixty-two-year-old female patient accidentally lost her catheter 3 weeks ago and had a complete occlusion of her left brachiocephalic vein **(a)**. Guide wire passed through the dilator to superior vena cava **(b)**. Balloon dilatation was performed on left occluded brachiocephalic vein **(c)**. Procedure completed after insertion of tunneled catheter **(d)**.

right atrium. In 28 patients, the tract was successfully cannulated with dilators, and in 7 patients, significant resistance prevented catheter insertion through the tunnel, so in those cases, dilators and a peel-away sheath were used for re-insertion of the tunneled hemodialysis catheters.

In 28 patients, a guide wire was used to navigate through the tunnel into central veins, and in 7 patients, a stiff wire was used as resistance prevented catheter navigation through the tunnel. In one patient, the left brachiocephalic vein was totally occluded. The balloon was inflated in the occluded segment after the effective dilatation of the left brachiocephalic vein, re-insertion of the tunneled dialysis catheter via the existing subcutaneous tract was achieved. All patients were examined at the first week, first month and 3 months after the procedure.

Results

The technical success of the re-insertion of tunneled HD catheters via existing subcutaneous tracts was achieved in all cases. No complications were observed during the process. The HD catheters were working well and no infection was observed in the follow-up examinations at 1 week, first month and 3 months. In this study, the catheters were re-inserted within 72 hrs of the initial procedure. In several days, the track becomes endothelialized as a fibrous thrombus; therefore, insertion of a new catheter through the existing subcutaneous tunnel may fail (4). Nevertheless, in the present study, successful re-insertion of the catheter was applied to 1 patient at 3 weeks after the inadvertent loss. During this study, it was determined that re-inserting the catheter to the initial procedure site takes less time than re-inserting it to a new site. The passage of the guide wire into the central veins was usually achieved within 77±45 seconds (range, 20–200 secs) and generally, the whole procedure took 8±4 minutes. Also, the procedure overall comfort was evaluated with the information obtained from the patients after the procedure and all patients reported that our method was more comfortable and easier for them when compared to the previous tunneled catheter placement procedure. During the follow-up period, no catheter infection was observed.

Discussion

Tunneled catheters can provide hemodialysis access to patients with renal insufficiency for several months. They are used until the fistula or graft maturation is complete which will take up to 3 months before dialysis. The risk of infection and venous stenosis or occlusion is more common in the tunneled catheters compared to the fistula.

(2). Some of the major reasons for catheter malfunction are fibrin sheath formation, catheter kinking or malposition, and thrombosis, both acute and chronic (5). Catheter fibrin sheaths can be easily disturbed by disruption during guide wire exchange or the use of balloon angioplasty (4). In case of acute thrombosis, various thrombolysis or thrombectomy techniques can be used to restore patency, albeit with a small risk of bleeding during these procedures (6–8). Catheter infection is another important point although tunneled venous catheter is increasingly commonly used as vascular access in hemodialytic patients, it is also a common cause of infection. International guidelines recommend limiting the long-term use of central venous catheters in patients undergoing hemodialysis because they expose the patient to a higher risk of infection than fistulas. However, for some patients with comorbidities, switching to permanent vascular access is not possible. In such cases, the catheter is used for a longer period. Therefore, it seems important to study the influence of a prolonged duration of catheterization on infectious complications (9, 10). If there is a suspected infection, catheter re-insertion should not be employed and it must be re-inserted to a new site. In chronic hemodialysis patients, accidental tunneled hemodialysis catheter loss is frequently observed. Even though a new catheter insertion using a fresh site is an option, catheter insertion to the existing exit site can also be accomplished. In this study, a successful re-insertion was applied to 35 patients with accidental loss of tunneled hemodialysis catheters, using the existing subcutaneous tracts rather than re-inserting the catheter with new venipuncture and subcutaneous tract. Blunt dissection from the original tract using a 5F or 6F vascular sheath and advancing the vein with a hydrophilic guidewire is the most important factor in the success of the procedure. Re-insertion of the catheter to the existing site avoids possible complications such as pneumohemothorax and venous rupture. This technique also protects other venous access sites from further trauma. Although the procedure was successfully performed after 3 weeks in one patient, we recommend performing the procedure within the first 3 days for the safety of the procedure and a successful outcome.

Conclusion

In conclusion, the results of this study suggest that tunneled catheter insertion using existing subcutaneous tracts could be successfully performed up to 72 hours after the accidental catheter lost. Also, the main advantages of this technique are; taking less time, decrease the need of sedation, and a more comfortable procedure for patients.

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