Clinical Kidney Journal, 2016, 1–4

doi: 10.1093/ckj/sfw089
Exceptional Case

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Cuff extrusion in peritoneal dialysis: single-centre experience with the cuff-shaving procedure in five patients over a 4-year period

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Abstract

Catheter-related infections in peritoneal dialysis (PD) remain a significant complication, and some patients with recurrent exit-site (ESI) and/or tunnel infections may experience external cuff extrusion. In these cases, cuff-shaving has been described as a possible course of treatment. During a 4-year period, there were 44 patients with PD at our department; all received double-cuffed Tenckhoff catheters. Six (13%) never started on PD. Five (13%) of the 38 active PD patients experienced cuff extrusion. Causes of end-stage renal disease (ESRD) were diabetic nephropathy ($n = 1$), toxic nephropathy ($n = 1$), hypertensive nephrosclerosis ($n = 1$), systemic disease ($n = 1$) and one with unknown cause. PD catheters were inserted by the Department of Surgery and our patients waited a mean of 3.71 weeks (0.57–7.86) from catheter insertion to PD start. Patients were followed up by monthly and even fortnightly during infections. Our cohort experienced two (1–5) ESIs per patient prior to cuff extrusion. Cultures showed growth of *Staphylococcus aureus* and the patients received dicloxacillin orally 500 mg qid for 3–4 weeks. Of the 38 active PD patients, 5 (13%) developed cuff extrusion with an incidence of 0.20 episodes/patient/year, manifesting on average at 32 weeks (17.3–40.6), due to repeated ESI in four patients and substantial weight loss in one patient. All five underwent cuff-shaving and the ESIs resolved completely in 80% of the cases assisted by supplemental treatment with mupirocin and/or dicloxacillin. There were no complications to the cuff-shaving procedure itself. None of the five patients experienced new ESIs after cuff-shaving had been performed. Cuff-shaving reduces the rate of recurring ESIs. The procedure is safe, if performed correctly, and poses no risk to the patient or the catheter.

Key words: catheter, chronic renal failure, dialysis, ESRD, peritoneal dialysis

Introduction

The proportion of patients with end-stage renal disease (ESRD) has increased in the elderly population in Norway, as in other western countries [1, 2]. Kidney transplantation is the method of choice for renal replacement therapy (RRT), compared to dialysis treatment, in patients with ESRD; however, not all of these patients can be offered kidney transplantation due to high age, medical conditions and long waiting lists for kidney transplantation [3]. Studies have shown that short-term outcomes for peritoneal dialysis (PD) and haemodialysis (HD) are comparable and PD is more cost-effective compared to HD [4, 5]. As the capacity for HD has been limited due to increased demand for RRT, experts have recommended more frequent use of PD [3, 5, 6]. Unfortunately, this method has not been utilized as frequently as recommended [7–10]. PD as a method for dialysis is not without complications, in spite of technical and medical advances in recent years. The most

Received: May 3, 2016. **Accepted:** July 12, 2016

significant of these complications are PD-related infections, which are peritonitis, exit-site infections (ESIs) and subcutaneous tunnel infections [11, 12]. The external cuff of the PD catheter can, in some patients with recurrent ESIs and/or tunnel infections, extrude from the catheter tunnel to the other space and complicate the treatment with recurrent infections, and ultimately lead to failure of PD treatment.

Unfortunately, the literature on external cuff extrusion secondary to recurrent ESIs is quite limited and consists mainly of anecdotal reports. We present our experience with the cuff-shaving procedure in five PD patients who developed cuff extrusion.

Materials and methods

During a 4-year period, there were 44 patients at our nephrology department with PD catheters. All received the double-cuffed Tenckhoff catheter. Six (13%) patients were never started on PD. Five (13%) of the 38 active PD patients experienced cuff extrusion. The mean age was 72.0 years (49–82). Causes of ESRD were diabetic nephropathy ($n = 1$), toxic nephropathy ($n = 1$), hypertensive nephrosclerosis ($n = 1$), systemic disease ($n = 1$) and one with unknown cause. Of these five patients, two received daily assistance from the district nursing service, while one was visited fortnightly by homecare.

PD catheters were inserted by the Department of Surgery. The outer Dacron cuff was positioned subcutaneously ~2 cm from the exit site. The tunnel itself was 5 cm long, with the inner Dacron cuff situated at the level of the abdominal wall, providing anchorage, while the remaining part of the catheter enters into the peritoneal cavity.

It is recommended that the catheter be allowed to settle for 3–4 weeks after implantation prior to it being taken into use [13]. Our patients waited a mean of 3.71 weeks (0.57–7.86) from catheter insertion to PD start. There were no post-operative complications. According to our local department guidelines, both a PD nurse and a nephrologist followed the PD patients up monthly, and even fortnightly during infections. Additionally, all patients had the option of phoning in for advice if necessary.

Cuff extrusion occurred due to repeated ESIs in four patients and secondary to substantial weight loss in one, manifesting itself spontaneously after a mean of 32 weeks (17.3–40.6).

These five patients (two women and three men) then underwent subsequent cuff-shaving. The removal of the extruded outer cuffs was performed under sterile conditions at the bedside

Fig. 1. Before removal.

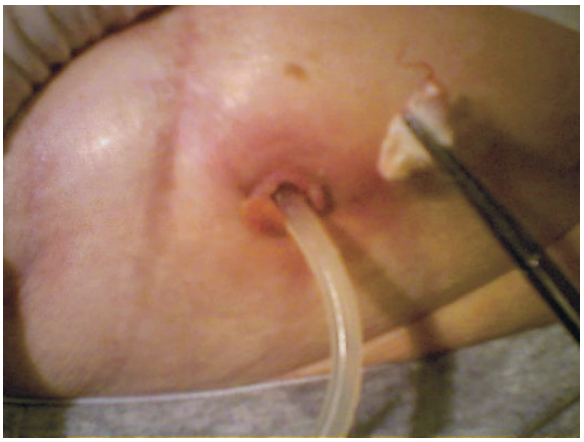

Fig. 2. Removal.

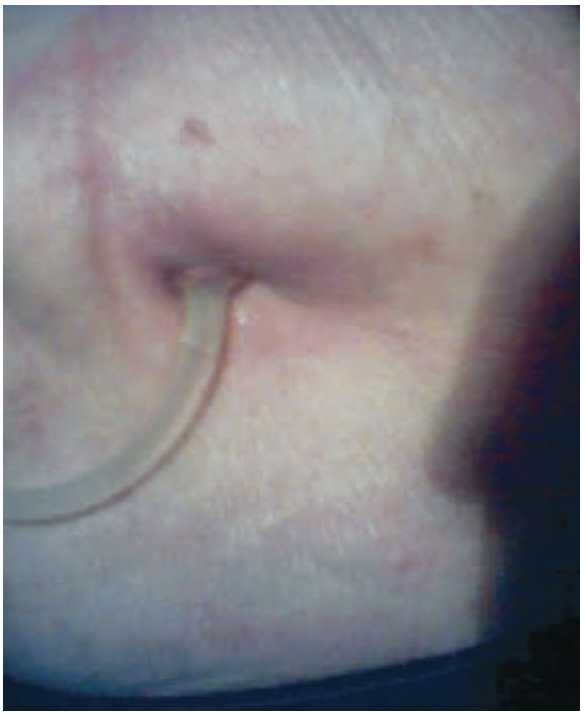

Fig. 3. Several weeks after removal.

with the use of blunt forceps. Patients were given prophylactic treatment with topical mupirocin cream to further aid in resolution of the infection. One patient also received dicloxacillin orally for 2 weeks. Finally, the exit sites were observed regularly until the infection had resolved (Figures 1–3).

Information was gathered from our patient's charts. Literature searches were conducted on MEDLINE/PubMed for 'cuff-shaving', 'cuff extrusion' and 'exit-site infection'. The articles outlined recommended treatment options, which were evaluated in regard to their content and relevance.

Results

Of the 38 active PD patients, 5 (13%) developed cuff extrusion. If the six inactive patients were included, this falls to 11%. Due to our relatively small population, the incidence of cuff extrusion

was only 0.20 episodes/patient/year, regardless of whether or not the inactive patients were included in the calculations.

Our cohort experienced a number of ESIs, with a mean of two (1–5) episodes per patient, prior to spontaneous cuff extrusion. In each case, secretion from the exit sites was cultured, and all showed growth of *Staphylococcus aureus*. These patients were treated with dicloxacillin orally 500 mg qid for 3–4 weeks in accordance with sensitivity testing. Although the infections cleared initially, in three of the five patients, the exit sites were rapidly re-infected.

The time from catheter implantation to cuff extrusion was 34.3 weeks (mean, 18.6–43.6 weeks). The duration was only marginally shorter from PD start until cuff extrusion. The extruded cuff was removed on the same day as it was first seen in the three men. The two women waited 10 and 248 days, respectively, mainly due to our inexperience with the cuff-shaving procedure and lack of published data on the subject. Once the infected cuff was removed, the ESIs resolved completely, except in one case, in which the patient received both mupirocin and dicloxacillin after the cuff-shaving procedure. In spite of this, there were clinical signs of ESI present at the end of the treatment course and he later developed peritonitis. Even though the ESI resolved in one patient, he eventually developed peritonitis, which could be attributed to prior colonization of the tunnel or peritoneum.

There were, however, no complications to the cuff-shaving procedure itself, and both patients were still receiving PD at the end of the study period.

However, the catheter was removed in three patients, one due to residual peritonitis in spite of resolved ESI, one due to flow-related problems and peritonitis, and one who received a kidney transplant.

Discussion

Even with modern management, PD patients continue to develop peritonitis, ESIs and tunnel infections [11, 12], which leads to a reduced quality of life and puts their dialysis treatment at risk. Prompt and effective antibiotic and antiseptic treatment has ameliorated this to a certain degree, but the incidence of these complications is still considerable. Schmidt and Holley state in their UpToDatereview from 2016 that 3.5–17% of outer cuffs eventually extrude from the subcutaneous tunnel [14]. We found a 13% rate of spontaneous cuff extrusion. They further state that this number does not depend on the catheter implantation technique or the type of catheter. However, numerous sources suggest that a curved catheter in a straight tunnel, or vice versa, or creating too short a tunnel are likely to cause cuff extrusion [13, 15]. In our small patient sample, the most frequent cause of cuff extrusion was multiple ESIs.

A 50–70% resolution of *S. aureus* infections after cuff-shaving has been reported [16, 17], though some sources have found the procedure to be ineffective [18]. We have demonstrated an 80% resolution of ESIs caused by *S. aureus*, assisted by supplemental treatment with mupirocin and/or dicloxacillin in two patients. Where residual peritonitis was found, it was likely due to bacteria that was already present either in the subcutaneous tunnel or in the peritoneal cavity, but had yet to present symptoms at the time of cuff-shaving. None of the five patients experienced new ESIs after cuff-shaving had been performed. It should be mentioned that our approach differed from that described in the literature, as no externalization of the outer cuff and subsequent unroofing of the tunnel tract were required [17–19]. In our patients, the outer cuff had already spontaneously extruded prior to cuff-shaving. The procedure was performed carefully by a nephrologist under sterile conditions at the outpatient dialysis clinic with the simple use of forceps and without manipulating the catheter, exit site or tunnel tract.

Conclusion

Spontaneously extruding PD catheter cuffs should be removed. If clinical signs of ESI are present, these cuffs are likely to be infected, and their removal will assist in resolving the infection. Additionally, cuff-shaving reduces the rate of recurring ESIs. The procedure is safe if performed correctly and poses no risk to the patient or the catheter. However, due to limited literature in regard to this procedure, further study should be done.

Conflict of interest statement

The authors had no involvements that might raise the question of bias in the work reported or in the conclusions, implications or opinions stated.

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