

USAGE OF PARAMEDIAN APPROACH FOR CONTINUOUS AMBULATORY PERITONEAL DIALYSIS CATHETER INSERTION TECHNIQUE AND COMPLICATION

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ABSTRACT

Objective: This study aims to review the usage and complication of paramedian approach for CAPD catheter insertion. **Material & Methods:** This is a retrospective study. All ESRD patients ongoing CAPD at the Dialysis Clinic of Zainoel Abidin General Hospital in Aceh, Indonesia between January 1, 2009 and December 31, 2018 were included in the present study. Complication outcomes included mechanical and infectious complications are documented and reviewed. **Results:** A total of 190 ESRD patients had been performed CAPD catheter insertion using paramedian approach in this period. Out of these patients, complication occurred in 31 cases (16.32%). All the complication that occurred in this study are 5 cases of leakage (2.63%), 9 cases of infection (4.74%), 8 cases of drainage problem (4.21%), 9 cases of malposition (4.74%), and no case of bowel perforation. From total of 9 cases of infections, 1 patient had peritonitis from the catheter insertion. The other infection was exit site infection. **Conclusion:** CAPD catheter insertion using paramedian approach is safe with low complication rates. It could decrease post-operative complications and can be recommended for CAPD catheter insertion technique due to its safety.

Keywords: Continuous ambulatory peritoneal dialysis, paramedian, complication, safety.

ABSTRAK

Tujuan: Meninjau penggunaan dan komplikasi dari teknik paramedian untuk pemasangan kateter CAPD. **Bahan & Cara:** Studi ini merupakan studi retrospektif. Seluruh pasien ESRD yang menjalani CAPD di Klinik Dialisis Rumah Sakit Umum Zainoel Abidin di Aceh, Indonesia, pada periode 1 Januari 2009 dan 31 Desember 2018 diikutsertakan ke dalam studi ini. Komplikasi yang meliputi komplikasi mekanis dan infeksius dicatat dan ditinjau pada studi. **Hasil:** Total sebanyak 190 pasien ESRD telah menjalani pemasangan kateter CAPD menggunakan teknik paramedian pada periode ini. Dari seluruh pasien, komplikasi terjadi sebanyak 31 kasus (16.32%). Seluruh komplikasi yang terjadi pada studi ini meliputi 5 kasus kebocoran (2.63%), 9 kasus infeksi (4.74%), 9 kasus malposisi (4.74%), dan tidak ada kasus perforasi usus. Dari 9 total kasus infeksi, 1 pasien mengalami peritonitis dari pemasangan kateter. Infeksi lainnya adalah infeksi exit-site. **Simpulan:** Pemasangan kateter CAPD menggunakan teknik paramedian aman dilakukan dengan angka komplikasi yang rendah. Tindakan ini dapat mengurangi komplikasi pasca-operasi dan bisa direkomendasikan untuk teknik pemasangan kateter CAPD karena tingkat keamanannya.

Kata Kunci: Continuous ambulatory peritoneal dialysis, paramedian, komplikasi, keamanan.

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INTRODUCTION

Continuous ambulatory peritoneal dialysis (CAPD) is one of the established renal replacement therapy to treat patients with end-stage renal disease (ESRD).¹ It has become a successful and effective therapy for ESRD in the global population.² It provides a choice for patients with ESRD of

effective home dialysis by themselves and supports optimal quality of life.³⁻⁴ A successful CAPD depends on the presence of a well-functioning dialysis catheter, defined as one that facilitates effective inflow and outflow of the dialysis solution.⁵

The technique of catheters insertion into the abdominal cavity was modified afterward. There were several techniques of CAPD such as open

procedure, percutaneous, and laparoscopic.⁶ These techniques were introduced to have fewer surgical traumas to the patient and to improve outcomes. The functional outcome of the catheter is the most relevant outcome parameter for patients. Dialysis exchanges time should be relatively short and without complication.⁷⁻⁸

Several complications such as inflow and outflow obstruction, leakage and migration of catheter, exit-site infections, and peritonitis can lead to catheter removal and loss of peritoneal access.⁹ Knowledge of the best technique and approach in catheter insertion can minimize the risk of catheter complications that can lead to peritoneal dialysis failure.¹⁰ Although different surgical techniques are used in practice for CAPD catheter insertion, the open technique is still the most frequently used technique. Two sites are commonly chosen for CAPD catheter insertion, midline, and paramedian approach.¹¹⁻¹²

The insertion technique may have a great influence on the occurrence of complications. In the literature, there is no exact data about the preferred operative technique for CAPD catheter insertion.

OBJECTIVE

This study aims to review paramedian technique for CAPD catheter insertion and complication.

MATERIAL & METHODS

We retrospectively studied all ESRD patients ongoing CAPD at the Dialysis Clinic of Zainoel Abidin General Hospital in Aceh, Indonesia. The patients had their first CAPD catheter insertion between January 1, 2009 and December 31, 2018. Inclusion criteria were the insertion of a CAPD catheter at Zainoel Abidin General Hospital during the study period. The medical records of the patients included in the study were reviewed for their clinical characteristics and complications. The patients were followed up from the date of CAPD catheter insertion and data were collected regarding the complications during CAPD. Outcomes and overall complication rates were retrospectively reviewed and studied. Catheter outcomes are analyzed and reviewed until March 2019 or until the discontinuation of CAPD due to mechanical and infectious complications of the catheter.

All catheter insertions were performed using the surgical open technique with paramedian approach under local anesthesia. All procedures were performed by urologist and residents. In all procedures, the catheter used was a 2-cuffed straight Tenckhoff catheter. An incision site about 2-4 cm to the left of the umbilicus is selected for catheter insertion. The location should be identified and marked prior to incision.

After infiltrating the skin and underlying tissue with local anesthetic (2% lidocaine), we make a horizontal incision 3-4 cm to expose subcutaneous tissue. Blunt dissection of the subcutaneous tissue is done until the anterior rectus sheath is seen and bleeding vessels are ligated or cauterized. The rectus fascia, rectus muscle, and peritoneum are infiltrated with local anesthetic. The rectus fascia and rectus muscle is then dissected until we reach the peritoneum. The peritoneum is incised to enter the peritoneal cavity. After that, the Tenckhoff catheter is positioned in the pelvic cavity with the aid of an introducer.¹³

The pubic symphysis has been recommended as a reliable landmark for the ideal location of the catheter tip in the true pelvis.¹⁰ The inner cuff is fixed to the external surface of the peritoneum by a purse string suture. The inner cuff is tunneled into the rectus muscle to prevent catheter leaks and further tunneled through the subcutaneous tissue leaving the outer cuff buried 2 cm from the exit site. A stab wound as the exit site is made using local anesthesia and a tunneling device or a Kelly clamp is inserted into the incision and tunneled into the subcutaneous tissues to grasp the catheter tip.

The catheter is pulled throughout the tunnel into the exit site. The subcutaneous tissue of the primary incision is closed with absorbable sutures and the skin is closed with subcuticular sutures.¹⁴ The exit site should not be sutured because it may cause an exit site infection.¹⁵

All catheters faced downwards, and at the end of the operation, a functional test was performed by instillation of 1.25 L dialysis solution. Approximately 200 mL was aspirated with a syringe to test the catheter function. The remaining solution was left intra-abdominally in order to minimize the risk of adhesions. All patients received a plain abdominal X-ray to confirm the position of the catheter on postoperative day 1. The CAPD catheters were not flushed afterward and were used after 2 weeks postoperatively.

The paramedian approach could provide more stabilized deep cuff fixation. It also minimizes the risk of malposition, herniation, and pericatheter leakage because the wound is reinforced by highly vascularized strong rectus muscle, in comparison to the poorly vascularized linear alba in the midline approach.¹²

RESULTS

Between January 1, 2009 and December 31, 2018, a total of 190 ESRD patients had been performed CAPD catheter insertion with paramedian approach. Out of these patients, complication occurred in 31 cases (16.32%). The data were collected regarding the complications during CAPD. From 31 patients with complication, only 22 cases need to be repaired (70.96%) and the rest of 9 cases only occurred minor complication that no need to be repaired (29.04%).

Complications related to CAPD catheter insertion with paramedian approach are summarized in Table 2. All the complication that occurred in this study are 5 cases of leakage (2.63%), 9 cases of infection (4.74%), 8 cases of drainage problem (4.21%), 9 cases of malposition (4.74%), and no case of bowel perforation. From the total of 9 cases of infections, 1 patient had peritonitis from the catheter insertion. The other infection was exit site infection.

DISCUSSION

The paramedian approach of CAPD catheter insertion has low complication rates (Table 1). The most common post-operative complications are infection, catheter malposition, and catheter drainage problem. Dialysate leakage is less common complication in this technique. Bowel and bladder perforation along with bleeding and hematoma are rare complications and not found in this study.

Infection that usually occurred in the CAPD catheter insertion are exit site infection and peritonitis. An exit site infection is one of the most frequent complications of CAPD catheters insertion in general. Infection attributed to the procedure are those that occurring soon after catheter placement. Several studies have vary definition of an early infection regard to the time period ranging from 2 weeks or longer.¹⁴

Peritonitis is more severe infectious complication of CAPD catheter insertion. Previous study that conducted by Hendersen et al in the study

of safety and efficacy of percutaneous insertion of CAPD catheters under local anaesthetic found that early peritonitis within 30 days occurred in 13% of the cases.¹⁶ From study by Buffington et al, early peritonitis occurred in 1.5% to 4% cases of several studies that they analyzed. Compared to this study, only 1 case of 190 total patients (0.52%) had peritonitis. Directing the exit site laterally or inferiorly reduces the occurrence of infection and usage of prophylactic antibiotics can prevent infection within the first 30 days of catheter insertion. However, the insertion sites apparently have no effect on catheter-related infection and peritonitis-free survival.¹²

Leakage of dialysate occurred in 2.63% of CAPD placement in this study. Leakage occurs when the deep cuff of Tenckhoff catheter displaced from the external surface of the peritoneum or is not tunneled into the rectus muscle so it does not form enough fibrotic reaction within the rectus muscle.¹⁴ Paramedian approach in CAPD catheter insertion could provide more stabilized deep cuff fixation because the peritoneum wound is reinforced by highly vascularized strong rectus muscle so can minimizes the risk of malposition, herniation, and leakage. In the other hand, other approach of open surgery CAPD insertion such as midline approach gives easier access to the peritoneal cavity but has higher leakage complication rates due to the poorly vascularized linear alba that reinforced the peritoneum.¹¹ Treatment of leakage is resting the peritoneum for 2 days to 3 weeks. The patient is still on hemodialysis for renal replacemenet therapy to give total rest of peritoneum, otherway we can use low volume dialysate.¹⁴

Majority of catheter dysfunction complication are drainage problems due to omental occlusion, obstruction, and malposition or migration of the catheter. This study shows 8 cases of drainage problem (4.21%) and 9 cases of malposition (4.74%) that result in catheter dysfunction. From study conducted by Kanokkantung et al that compare clinical outcomes among CAPD patients who had paramedian incision versus midline incision, mechanical catheter dysfunction occurred in 53 cases, there are 6 cases (6.67%) in the paramedian group and 47 cases (18.15%) in the midline group. The authors found that paramedian approach can decrease the rate of catheter dysfunction complication, which results in improved catheter survival and overall patient survival.¹² Bowel and bladder perforations are very rare with a number of studies reporting no

occurrences.¹⁰ In this study showed no case of bowel perforation occurred in the period.

CONCLUSION

In conclusion, CAPD catheter insertion using paramedian approach is safe with low complication rates. This study showed that paramedian approach could decrease post-operative complications, especially with the lower risk of leakage and catheter dysfunction complication. Therefore, paramedian approach can be recommended for CAPD catheter insertion technique due to its safety and low complication rates.

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