COMPARISON OF CONTINUOUS AMBULATORY PERITONEAL DIALYSIS TENCKHOFF CATHETER INSERTION (OPEN SURGERY VS LAPAROSCOPIC) – A CASE CONTROL STUDY

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ABSTRACT

Objective: *This study aims to investigate post-operative complication rate of Tenckhoff catheter placement methodsbetween open surgery and laparoscopic.**Material &Methods:** This is a case control comparative study reviewed from the medical records of patients who required insertion, removal, or repairment of Tenckhoff catheter for the provision of CAPD at Hasan Sadikin Bandung general hospital between January 2015 to December 2020. Clinical outcome and complication were compared between the open surgery and laparoscopic group.**Results:** We obtained 30 patients who required insertion of a Tenckhoff catheter for the provision of CAPD, 15 patients by open surgery and 15 patients by laparoscopic technique. Insertion of Tenckhoff catheter using open surgery have a higher risk of catheter migration (p=0.049; OR=3.25) and infection (p=0.014;OR=12.25) compared to laparoscopic. **Discussion:** Laparoscopic technique facilitates omentectomy, allows better fixation under direct visualisation, and for lysis of adhesions to increase peritoneal surface. **Conclusion:** Tenckhoff catheter insertion by using laparoscopic surgery tend to have better outcome compared to open surgery, with lower risk of catheter migration and infection.*

Keywords: *Tenckhoff catheter, laparoscopic, CAPD.*

ABSTRAK

Tujuan: *Penelitian ini bertujuan untuk mengetahui tingkat komplikasi pasca operasi metode penempatan kateter Tenckhoff antara operasi terbuka dan laparoskopi. **Bahan& Cara:** Penelitian ini merupakan studi komparatif case control yang ditinjau dari rekam medis pasien yang memerlukan pemasangan, pelepasan, atau perbaikan kateter Tenckhoff untuk pemberian CAPD di RSUD Hasan Sadikin Bandung antara bulan Januari 2015 hingga Desember 2020. Luaran klinis dan komplikasi dibandingkan antara kelompok bedah terbuka dan laparoskopi. **Hasil:** Kami memperoleh 30 pasien yang memerlukan pemasangan kateterTenckhoff untuk pemberian CAPD, 15 pasien dengan operasi terbuka dan 15 pasien dengan teknik laparoskopi. Pemasangan kateter Tenckhoff dengan operasi terbuka memiliki risiko migrasi kateter (p=0.049; O R=3.25) dan infeksi (p=0.014; OR=12.25) yang lebih tinggi dibandingkan dengan laparoskopi. **Diskusi:** Teknik laparoskopi memfasilitasi omentektomi, memungkinkan fiksasi yang lebih baik dengan visualisasi langsung, dan untuk lisis adhesi guna meningkatkan permukaan peritoneum. **Simpulan:** Pemasangan kateter Tenckhoff dengan menggunakan bedah laparoskopi cenderung memberikan hasil yang lebih baik dibandingkandenganbedahterbuka, dengan risiko migrasi kateter dan infeksi yang lebih rendah.*

Kata kunci: *Kateter Tenckhoff, laparoskopi, CAPD.*

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INTRODUCTION

Chronic kidney disease (CKD) is a damage of kidney for more than 3 months that cause the glomerular filtration rate (GFR) less than 60 mL/min/1.73 m^2.[1] The incidence of CKD in Indonesia has increased to 1– 2% of total population. A previous study reported that 57% of end-stage renal disease patients were male and 43% were female, with the most common incidence found in age group of 50 - 59 years, comprising 25% of total patients.[2] Chronic Kidney Disease is responsible for more deaths annually than breast cancer or prostate cancer.[3] In 2016, the cost to Medicare for patients

with CKD exceeded 20% of the entire Medicare budget.[4] The transition from advanced CKD to end-stage renal disease (ESRD) represents a vulnerable period, when multiple physiologic and psychosocial changes occur as patients prepare for either dialysis or kidney transplantation. Observational studies have suggested a lack of survival benefit to early initiation of dialysis or earlier preemptive transplantation.[5]

Patients with end-stage renal disease require renal replacement therapy (RRT) to replace reduced renal function, either naturally by replacement of a healthy kidney (renal transplantation) or artificially by replacing with artificial kidney (dialysis), either by hemodialysis (HD) or peritoneal dialysis.[2] Peritoneal dialysis is widely accepted for the management of patients with end-stage renal disease (ESRD). Historically, Maxwell et al described a simple method of intermittent irrigation of the peritoneal cavity with a single disposable catheter. After technical advances achieved in dialysis catheters, Popovich et al developed the continuous ambulatory peritoneal dialysis (CAPD) method.[6]

Compared with facility hemodialysis, CAPD is more cost-effective, is less technically demanding, minimizes the exposure of patients to hospital-acquired infectionsis more feasible in rural and remote settings, and is associated with better preservation of residual kidney function.[7] The key to succesful long-term peritoneal dialysis (PD) therapy is permanent and safe access to the peritoneal cavity.[4] Currently available methods for catheter placement are principally classified as: (1) bedside insertion or percutaneous implantation involving a trocar or guide wire inserted into the abdomen and advancement of the dialysis catheter into the abdomen without visualization; (2) surgical insertion or open dissection, in which small dissection of the peritoneum allows limited visualization of the peritoneal cavity; (3) peritoneoscopic insertion, in which a Y-TEC peritoneoscope is inserted to inspect the peritoneal cavity, thus identifying the best location for the dialysis catheter; (4) laparoscopic insertion, in which adhesiolysis or more sophisticated surgery is possible during catheter placement.[8] Such reports have indicated laparoscopic surgery has a lower failed-insertion rate (0% to 2.4%), a lower short-term complication rate (0% to 9.5%), and a higher long-term catheter survival rate (63% to 85%) than that of open surgery. However, other studies have reported otherwise.[8]

OBJECTIVE

Because open CAPD or laparoscopic CAPD have each advantages and disadvantages, this study was aimed to differentiate the technical procedure of open surgery vs laparoscopic CAPD and complication that may be happen.

MATERIAL &METHODS

From the period of January 2015 to December 2020, we retrospectively reviewed the medical records of patients who underwent CAPD in the department of Urology, Hasan Sadikin Bandung General Hospital. At the time of inclusion in the study, demographic and clinical data were recorded. The insertion technique used for both catheters was also obtained from the medical record.Patient characteristics, operation-related data, positive findings in procedural complications, and clinical outcome were recorded and compared between the two study groups. Analyzed factors includedtypes of complications, such as catheter migration, dialysate leak, exit site infection, and peritonitis.

RESULTS

From the period of January 2015 to December 2020 obtained 30 patients who underwent insertion of a Tenckhoff catheter for the provision of CAPD, 15 patients underwent open insertion technique and 15 patients via laparoscopic technique with the average age of 35+13.90 years. From all 30 patients, 16 patients (53.3%) were male and 14 patients (46.7%) were female, 15 patients (50%) underwent open surgery technique, and 15 patients (50%) underwent laparoscopic approach for catheter insertion. The demographic characteristic of our subjects were found as shown in Table 1

In this study, the incidence of overall complications was found to be higher in open surgery group (Table2& Table 3). The complication of catheter malposition and peritonitis rate was significantly lower in laparoscopic group. Insertion of Tenckhoff catheter using open surgery have a higher risk of catheter migration (p=0.049; OR=3.25) and infection (p=0.014; OR=12.25) compared to laparoscopic. .

Table 1. Demographic characteristic of subject.

Characteristic	Total (n)	Percentage (%)
Average age ± std (years, range)	35±13,90	
Age		
0 – <1	0	0
1 – <10	1	3.3
10 - < 20	7	23.3
20 - <65	21	70
≥ 65	1	3.3
Sex		
Male	16	53.3
Female	14	46.7
Catheter insertion method		
Open surgery	15	50
Laparoscopic	15	50

Table 2. Comparation catheter migration or malposition complication between two techniques.

	Malposition		Total Reinsertion	P-value
	Yes	No		
Procedural technique				
Open-surgery	5 (33.3%)	10 (66.7%)	15	P= 0.049
Laparoscopy	2 (13.3%)	13 (86.7%)	15	OR= 3.25

Table 3. Comparation peritonitis or infection complication between two techniques.

	Peritonitis / Infection		Total	P-value
	Yes	No		
Procedural technique				
Open-surgery	7(46.6%)	8 (53.3%)	15	P= 0.014
Laparoscopy	1 (6.7%)	14 (93.3%)	15	OR= 12.25

DISCUSSION

An ideal method of peritoneal dialysis catheter placement should have characters including safe, less complication, easily performable, and less costs. In this study, we can see the benefit of safe and less complication of catheter migration in the laparoscopic group. The catheter dysfunction-free survival also showed better outcome in the laparoscopic group. In the clinical practice, we also found the benefit in the direct vision and definitely positioning of the catheter while using laparoscopy.Patients who had previous abdominal surgery may have difficulty of catheter positioning because of possible intraperitoneal adhesions.[9]

Mechanical obstruction of a peritoneal dialysis catheter usually results from malplacement at the operation, omental wrapping, adhesions, or catheter migration out of the pelvis. The peritoneal dialysis catheter may spontaneously undergo repositioning from a dependent to a nondependent position in the abdomen, reducing dialysate return at the end of the dwell period. These problems may occur immediately or several months after insertion.[10] Laparoscopic procedure provided the patient reduced perioperative discomfort and earlier

return to full mobility. Compared to traditional peritoneal dialysis catheter placement, laparoscopic catheter placement has smaller scar, less pain, and quicker recovery.[11]

The incidence of overall complications was found to be higher in open surgery group compared to laparoscopy-assisted group. Several studies have demonstrated that securing of the catheter tip in the pelvis reduces the incidence of catheter obstruction. This is easily accomplished by a laparoscopic approach using techniques which vary from suturing to stapling the suture loop to the pelvic peritoneum.[6] The results of our study was also similar to that of Tsimoyiannis et al which showed that laparoscopic placement provided better catheter survival than the open procedure.[12] The early and late complication rates in our study compare favorably with those of published series involving both open and laparoscopic insertions.[13] The lower incidence of catheter migration in the early stages of laparoscopic procedure in the laparoscopic group may be due to better initial catheter position under direct laparoscopic vision.[8]

Migration is reported in case-series in 1.3–5.4% of the laparoscopically inserted PD catheters and in 7.6– 17.1% when using the open technique. A possible advantage of the laparoscopic insertion technique might be the ability to fixate the catheter to the ventral abdominal wall. Jwo, Li, Lund, Soontrapornchai and Tsimoyiannis accurately described the incidence of migration. Li, Soontrapornchai and Tsimoyiannis used a fixation technique in the laparoscopic group; they reported no migration. The overall effectiveness of laparoscopic insertion to prevent catheter migration seems clear.[8,14]

According to Ogunc et al., the exit site infection or peritonitis was only reported significantly lower rate in laparoscopic placement.[8] Hagen et al. reported no difference in the incidence of peritonitis when using the open insertion technique or the laparoscopic technique, but there seems to be an overall trend in favour of laparoscopy. The variety in peritonitis incidence in different reports may partly be due to a different antibiotic (AB) prophylaxis regimen used. There is no consensus about which AB to administer and when it should be given to prevent peritonitis. The type of AB used, may influence the incidence of peritonitis.The incidence of exit-site/tunnel infections also does not differ between the laparoscopic and open insertion technique. In all cases, the PD catheter was subcutaneously tunnelled, which is thought to reduce the incidence of exit-site infections, regardless of the insertion technique.[14]

According to a study by Li et al, there are somehow disadvantages in the laparoscopic peritoneal dialysis catheter placement. The preparation of laparoscopic instruments is time consuming. Although the operation time seemed equally between 2 groups, nursing aid may take 10 to 30 minutes longer in the laparoscopic group. The total operation cost is increased in the staffs training, laparoscopic instrument sets, and other consumables.[9]

CONCLUSION

Tenckhoff catheter insertion by using laparoscopic surgery tend to have better outcome compared to open surgery. The laparoscopic technique allow omentectomy,better visualization, and secure fixation of the catheter lowered the risk of catheter migration and infection complication compared to open technique.

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