Effectiveness and Complications of Laparoscopic-assisted Insertion of the Peritoneal Dialysis Catheters

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ABSTRACT

Objective — *To evaluate the usefulness and complications of placement of laparoscopically assisted (LA) peritoneal dialysis catheter (PDC).*

Study design — *Cross sectional study.*

Place & Duration of study — *King Fahad Hofuf hospital, Al-Ahsa, Kingdom of Saudi Arabia, from December 2014 to November 2018.*

Methodology — *All patients with end stage renal failure (ESRF) requiring renal transplant, referred for inserting the PDC, were included. Patients not fit for general anesthesia and those who developed complications related to the pneumoperitoneum were excluded. Preoperative renal and liver functions test were performed when needed. Most of the patients were operated through single port. The postoperative outcome including complications were recorded. The data was analyzed by SPSS-19.*

Results — *Thirty one patients were included. Twenty-three (74.19%) were males and eight (25.8%) females (ratio - 4:1). The age of the patients was from 17-65 years (mean 46 + 11.2 year). In 25 (80.6%) patients, the laparoscopic procedure was performed through a single port. Other six (19.35%) required additional ports. In these patients, 35 operations were performed. Repositioning of the catheter was required in four patients who developed complications. The primary clinical success was noted in twenty-three (74.2%) and complications occurred in eight (25.8%) patients. One (3.2%) patient had blockage of catheter, one (3.2%) malposition, and one (3.2%) migration of the catheter. In one (3.2%) patient, the omental adhesions developed. Two (6.4%) patients had port-site infection and treated with systemic and local antibiotics. Two (6.4%) patients developed peritonitis in whom the catheter was removed.*

Conclusions — *The LA method to insert PDC is a good and easy approach that can be used safely. It is associated with low morbidity and a few complications related to the catheter that can be treated easily.*

Key words — *Laparoscopic peritoneal dialysis, Peritoneoscopy, End-stage renal failure (ESRF).*

INTRODUCTION:

More than 100,000 patients (15% of the population getting dialysis) of end-stage renal failure (ESRF) are treated by the peritoneal dialysis (PD) worldwide. Although, there are other modalities of dialysis, but PD is still considered as useful early therapy for the ESRF patients.[1-4]

One of the important aspects of the success of PD is the presence of a functioning peritoneal dialysis catheter (PDC).[3] Different methods for the insertion of a PDC are reported, including open surgery, blind insertion with or without radiologic assistance and

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laparoscopic-assisted insertion. Number of complications may occur with these approaches, namely the risk of visceral damage, infection, bleeding, catheter blockage and subsequent catheter migration, which may result in failed dialysis.[5-7] Laparoscopic-assisted (LA) insertion of PDC is cost-effective because of the shorter hospital stay and accurate placement, reducing the complications associated with some other techniques.[1] Moreover, LA insertion may help in the management of malfunctioning PDC.[3,8-11] This study aimed to evaluate the effectiveness and complications of the LA insertion of PDC for PD therapy in ESRF patients.

METHODOLOGY:

This was a cross sectional study conducted at King Fahad Hofuf hospital, Al-Ahsa, Kingdom of Saudi Arabia, from December 2014 to November 2018 on the patients of ESRF who underwent PDC by LA method. The patients who were not fit for general anesthesia and developed complications related to the pneumoperitoneum, were excluded. Preoperative renal and liver functions test, hepatitis and bleeding and clotting profiles were checked along with the routine investigations.

The procedure was performed in supine position under general anesthesia using aseptic precautions. Standard procedure was performed to create pneumoperitoneum at a gradual pressure of 10-12 mmHg by using Veress needle (closed method). In 25 out of 31 patients, the procedure was performed through a single port, which was inserted at the left hypochondrium, 2 cm below the costal margin along the midclavicular line. In patients with adhesions due to previous surgery or bulky omentum needing omentopexy, more than one port was placed. In two patients having bulky omentum, omentopexy was performed before the insertion of the catheter by adding another port of 5 mm under direct vision in the right hypochondrial area at the anterior axillary line. A percutaneous straight needle with (2-0) Vicryl or PDS suture was used to fix the omentum with the abdominal wall at the level of the right lumbar area.

In a patient with past history of tuberculosis adhesiolysis was performed laparoscopically using two extra ports: One port was inserted at 5 cm to the left and the other 5 cm to the right of the umbilicus. The Tenckhoff catheter was passed in to the peritoneal cavity through the pull-apart sheath over a stylet of 90 cm. The tip of the catheter was kept in the pelvis toward the urinary bladder. The cuff of the catheter was placed in the rectus sheath. A subcutaneous tunnel was created for the catheter to exit it on a midway point between umbilicus and the iliac crest. The possible kinking or the obstruction of the catheter was checked by flushing the normal saline. The skin incisions were sutured. Lignocaine with adrenaline diluted in normal saline was injected at the incision site and in the tunnel space. Early PD was started on the next day by using a small amount of dialyzing solution (about 500–1000 ml). Follow-up at the outpatient department was done initially weekly, then monthly up to the maximum period of 48 (mean = 30) months.

Postoperative malfunctioning of the inserted PD like blockage, malposition, migration, omental adhesions, port-site hernia and infection were noted. The data were entered into SPSS-19. The complications were categorized into early and late that occurred within two weeks or afterwards respectively.

RESULTS:

Total of 31 patients had LA insertion of PDC, out of which, 23 (74.19%) were males and 8 (25.8%) females (M:F = 4:1). Age of the patients was 17 to 65 year with the mean of 46 +11.2 year. In 25 (80.6%) patients, the laparoscopic procedure was performed through a single port. Six (19.6%) patients required additional ports. The operative time was 12 - 40 minutes (mean 23 minutes). The hospitalization time was 1-3 days. Success was noted in 23 (74.2%) patients and complications occurred in eight (25.8%). Twenty-nine (93.5%) patients were maintained on PD after the period of follow-up from 16 to 48 (mean=30) months, while the remaining two who developed peritonitis, were shifted to hemodialysis.

Two patients developed hypotension during the creation of the pneumoperitoneum and could not tolerate general anesthesia. They were resuscitated and excluded from the study. Four (12.9%) patients developed catheter-related complications (blockage, malposition, migration and omental adhesions); and the procedure was repeated in them. Out of the above three patients, early complications occurred in two (6.4%) and catheters were re-adjusted successfully by laparoscopic wire manipulation. Removal of the catheter and insertion of a new one on the other side was required in one (3.2%) patient. One (3.2%) patient presented to the emergency room after eight months with complaints of a non-functioning catheter, wherein the diagnostic laparoscopy revealed catheter blockage by severe omental adhesions that required omentopexy and insertion of a new PDC.

Other late complication was infection that was noted in four patients. Two (6.4%) patients had port site infection (the isolated organisms were

Table I: Complications of Surgery

Complication	Frequency (%)	Early/Late	Second procedure	Result	Fate
Blockage	1 (3.2%)	Early	Repositioning by laparoscopic wire manipulation	Success	Still on PD
Malposition	1 (3.2%)	Early	Repositioning by laparoscopic wire manipulation	Success	Still on PD
Migration	1 (3.2%)	Early	Repositioning failed twice. New catheter inserted	Success	Still on PD
Omental adhesions	1 (3.2%)	Late	Laparoscopic reimplantation + Omentopexy	Success	Still on PD
Port-site infection	2 (6.4%)	Late	Antibiotics	--	Still on PD
Peritonitis	2 (6.4%)	Late	Removal of the catheter + antibiotics	--	Shifted to hemodialysis
Total	8 (25.8%)				

Table II: Diagnostic Laparoscopy Findings (Adhesions)

Cause	Frequency (%) (n=31)	No. of ports used
Splenectomy	1 (3.2%)	02
Abdominal T.B	1 (3.2%)	03
Appendectomy	3 (9.6%)	01
Laparoscopic cholecystectomy	2 (6.4%)	01
C/section	2 (6.4%)	02
Total	9 (29%)	-
Bulky omentum (Requiring omentopexy)	2 (6.4)	02

Staphylococcus aureus in both). They were successfully treated conservatively. The other two (6.4%) patients presented at three and eight months' time after operation with peritonitis (the isolated organisms were Pseudomonas aeruginosa in both of them). The patients who developed peritonitis were having diabetes mellitus type II. These were managed by removal of the catheter, intravenous antibiotics for two weeks and shifting them to hemodialysis. No cases of port-site hernia were reported table I.

Diagnostic laparoscopy at the start of every procedure, revealed adhesions in nine patients and bulky omentum in two patients. Limited adhesiolysis/omentopexy was performed in these patients by inserting additional ports. In 25 (80.6%) patients, the laparoscopic procedure was performed through a single port. Other six (19.35%) required additional ports (table II).

DISCUSSION:

All recent publications on the best practices for peritoneal access have aimed to optimize care for

patients and decrease the complication rate.[12-14] Laparoscopic placement of PDC has gained wide popularity as it has the lowest rate of catheter-related complications as well as the longest duration of catheter survival.[15]

Nevertheless, laparoscopic surgery is performed under general anesthesia and some complications may develop due to the procedure itself. In our study, there were patients who developed hypotension with pneumoperitoneum or could not tolerate general anesthesia. In these cases, the procedure was aborted. There were no intraoperative complications. In previously published studies, 5% of patients experienced peri/postoperative hemorrhage; half of them underwent surgical re-exploration.[1] Catheter malfunction is the second most frequent complication of the procedure. Hence, the catheter is removed in around 20% of such patients. Many reasons may exist for this problem, such as occlusion by bowel, omentum or clot or adhesions and migration of the catheter tip outside the pelvis.[16]

The current study achieved a 100% success rate when laparoscopy was performed to correct the catheter-related complications. One study reported a success rate of 96% when laparoscopy was used for the management of mal-functioning catheters.[17] In this study catheter-related complications (blockage, malposition and migration) encountered in three (9.6%) patients. This is higher than 1.3% catheter migration in other studies.[18] The catheter blockage and dislocation by the greater omentum was observed in only one (3.2%) case of omental wrapping in the current study. Adhesiolysis was required in only two cases in this series with severe adhesions in a patient with a history of splenectomy and treated abdominal tuberculosis.

Laparoscopy is the best way to find the suitability of the abdominal cavity for PD in patients with adhesions and peritonitis.[19] Most laparoscopic techniques use two to four ports, with the disadvantages that each port entry may create a weak abdominal site for future hernia or leak.[20-22] The single-port approach has been recently introduced for the management of obstructed catheters and placement of new catheters into abdomen.[23,24] This was the procedure of choice in our study. However, in six (19.35%) cases, it was deemed necessary to use other port(s) to perform adhesiolysis or omentopexy. These included having previous splenectomy, treated abdominal TB, C/sections and bulky omentum.

It is observed that the incisional hernia occurs most commonly through incisions for bigger ports (>10 mm). Using smaller ports (5-mm) reduces considerably the chance of port-site hernia. In addition, longer the procedure, higher is the risk of developing such hernias.[25] Port site infection and peritonitis occurred in 6.4%. The incidence of both complications was 2.5% and 2.5%, respectively, in other studies.[15]

CONCLUSIONS:

LA insertion of PDC is feasible and can be safely used in ESRF patients with fewer complications and less morbidity.

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