

POST-OPERATIVE OUTCOME OF LAPAROSCOPIC PERITONEAL DIALYSIS CATHETER INSERTION/SALVAGE BY THE “SANTOSH-PGI HANGING LOOP TECHNIQUE”: RESULTS FROM A TERTIARY CARE SINGLE-CENTRE EXPERIENCE

Urology

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ABSTRACT

Objectives: To analyse post-operative outcomes and gauge the operative efficacy in 17 patients undergoing laparoscopic peritoneal dialysis catheter insertion by the “Santosh-PGI Hanging Loop Technique”. **Patients & Methods:** From 2015-2022, patients undergoing laparoscopic peritoneal dialysis catheter insertion/salvage by the “Santosh-PGI Hanging Loop Technique” was retrieved from the institutional database. Details regarding surgical outcomes were analysed. **Results:** During the study period, 17 patients having end-stage kidney disease, underwent laparoscopic peritoneal dialysis catheter insertion/salvage by the “Santosh-PGI Hanging Loop Technique”. The mean postoperative follow-up period was 16.33 (1-53) months. At the end of the follow-up period, 1(5.88%) catheter had malfunctioned/migrated, 5(29.41%) patients had died (due to unrelated causes; catheters were functional at the time of demise), and 11(64.70%) were functioning well. 9(52.94%) patients were salvage cases (operated outside initially, by other surgeons) and all had functional catheters at the end of the follow-up period. All cases were operated by a single surgeon. Altogether, we found a success rate of more than 90 %. **Conclusion:** Patients undergoing laparoscopic peritoneal dialysis catheter insertion/salvage by the “Santosh-PGI Hanging Loop Technique” have a high rate of functioning catheters, ultimately leading to an improved survival rate and patient satisfaction, in patients with end-stage renal disease.

KEYWORDS

end-stage kidney disease, laparoscopic, peritoneal dialysis

INTRODUCTION

Patients with ESKD (End-Stage Kidney Disease) represent a significant proportion of patients with chronic kidney disease, and although renal transplantation has become widely available, issues regarding donor availability, a long waiting list for transplant, and donor incompatibility continue to prolong the illness and hence lead to more and more demand for dialysis^[1]. Many patients and nephrologists opt for the placement of peritoneal dialysis catheter for continuous ambulatory dialysis, which affords a better quality of life to the patient. The peritoneal access device was first described in 1968 by Tenckhoff^[4]; subsequently, Moncrief and Popovich first described & performed the dialysis technique in 1975^[10] that came to be known as CAPD (Continuous Ambulatory Peritoneal Dialysis), and since then, has stood the test of time.

CAPD is a prevalent mode of renal replacement therapy with nearly 197,000 ESKD patients using it globally^[1]. Adequate function of peritoneal dialysis catheter is of paramount importance, and is defined as that which allows good inflow and outflow of dialysate, at the time of dialysis^[2]. Although the use of a purse-string suture is advocated in the international guidelines formulated by the ISPD (International Society for Peritoneal Dialysis)^[11], it may lead to adhesions, band formation & intestinal obstruction^[12] in the future; the Santosh-PGI Hanging Loop technique (which utilizes pre-knotted polypropylene loops) avoids any of these complications, obviates the need for complex laparoscopic intracorporeal suturing manoeuvres & may also facilitate easy retrieval (if needed) owing to the formation of a well-established tunnel between the 2 hanging loops. It is an already established technique in medical literature, being regularly practiced at our institute, with encouraging results^[3], especially for laparoscopic salvage of catheter malfunction.

PATIENTS AND METHODS

A total of 17 patients underwent laparoscopic peritoneal dialysis catheter insertion/salvage by the “Santosh-PGI Hanging Loop Technique”. Of the 17 patients, 9(52.94%) were salvage/re-do cases. Out of the 17 cases, 13(76.47%) were female and 4(23.52%) were male patients.

Patient	Procedure	Follow up	Status
1	Lap CAPD cathetersalvage	1 month	working
2	Lap CAPD catheter insertion	6 months	working
3	Lap CAPD insertion	8 months	working
4	Lap CAPD catheter salvage	9 months	working
5	Lap CAPD	9.5 months	working
6	Lap CAPD	8 months	working
7	Lap CAPD cathetersalvage	1 month	Malfunctioned (migrated)
8	Lap CAPD	13 months	working
9	Lap CAPD cathetersalvage	14 months	working
10	Lap CAPD cathetersalvage	13.5 months	working
11	Lap CAPD removal + reinsertion	10 months	Expired
12	Lap CAPD	51 months	working
13	Lap CAPD cathetersalvage	53 months	working
14	Lap CAPD	20 months	expired
15	Lap CAPD cathetersalvage	24.5 months	Expired
16	Lap CAPD	18 months	Expired
17	Lap CAPD cathetersalvage	24 months	Expired

The laparoscopic approach consisted of insertion of 3 ports, after creation of pneumoperitoneum using the Hasson's technique (Fig. 1). Special care was taken to not insert ports in the midline, considering the potential risk of hernia formation later on with high intraperitoneal pressures associated with peritoneal dialysis. The catheter was then positioned intra-abdominally through the polypropylene loops of the “Santosh-PGI Hanging Loop Technique” and a post-operative abdominal roentgenogram was done for the purpose of documentation (and served as a baseline for further roentgenograms required in suspected cases of catheter migration).

In cases with omental wrapping leading to catheter malfunction (Fig. 2-5), the omentum was subsequently released by a bipolar energy device & repositioned in the pelvis with the “Santosh-PGI Hanging Loop Technique” (Fig. 4 & 5). Sequential steps of the same are described in figures 2-5. A catheter flow test (checking of the inflow & outflow) was done intra-operatively (dialysate solution was instilled, free inflow & outflow was confirmed) (Fig. 6).



Fig. 1: A 12 mm camera port (depicted by the middle blue cross),

another 12 mm working port and a 5 mm working port (depicted by the green cross, in the paramedian plane) were used in the technique.

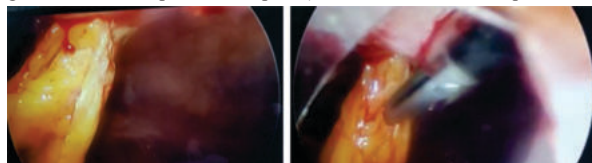


Fig. 2: Omentum seen to be wrapped around the peritoneal dialysis catheter

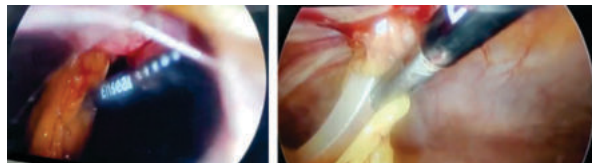


Fig. 3 : Bipolar energy device used to denude the peritoneal dialysis catheter

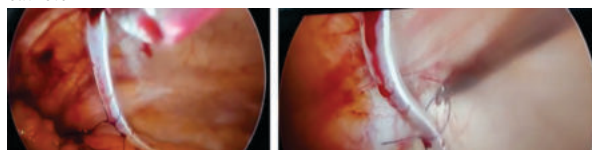


Fig. 4: Peritoneal dialysis catheter repositioned in the pelvis and seen to hang in the pre-knotted polypropylene loops, as per the “Santosh-PGI Hanging Loop Technique”

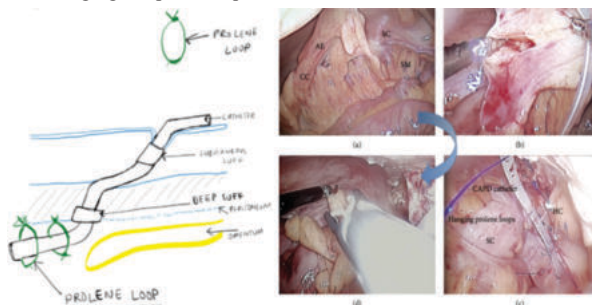


Fig. 5: Diagrammatic representation of the CAPD catheter within the hanging polypropylene loops. Laparoscopic view demonstrating wrapped-up CAPD catheter by appendices epiploicae of sigmoid colon (a). Dissection of the catheter from epiploicae using harmonic shear device (b). CAPD catheter hanging freely over polypropylene loops that are fixed to the pelvic parietal peritoneum using hemostatic clips (c). Epiploxy using hemostatic clips (d) (AE = appendices epiploicae; CC = CAPD catheter; SC = sigmoid colon; SM = sigmoid mesocolon; HC = hemostatic clips)^[3].

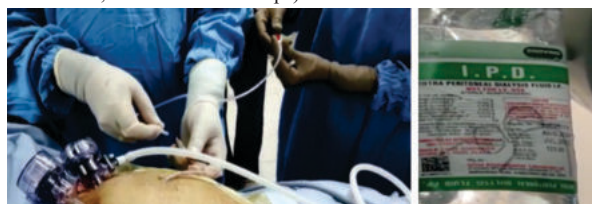


Fig. 6: Intra-operative Catheter Flow Test Done And Confirmed The Free Inflow And Outflow Of Dialysate.

Results: During the study period, 17 patients having end-stage renal disease, underwent laparoscopic peritoneal dialysis catheter insertion/salvage by the “Santosh-PGI Hanging Loop Technique”. Mean age of the patients was 55.35(38-74) years. Out of the 17 cases, 13(76.47%) were female and 4(23.52%) were male patients. 9(52.94%) were salvage/re-do cases (operated outside initially, by other surgeons); all had functional catheters at the end of the follow-up period. The mean postoperative follow-up period was 16.33 (1-53) months. At the end of the follow-up period, 1(5.88%) catheter had malfunctioned/migrated, 5(29.41%) patients had died (due to unrelated causes; catheters were functional at the time of demise), and 11(64.70%) were functioning well. All cases were operated by a single surgeon. None of the patients developed incisional hernias at any of the access sites.

DISCUSSION AND CONCLUSION

While patient outcomes and overall effectiveness of CAPD and haemodialysis are similar, peritoneal dialysis (PD) provides an important edge in early residual renal preservation^[5-7]. It also provides an advantage in treatment satisfaction and overall patient happiness^[8,9]. Patients undergoing CAPD catheter placement are physiologically complex to manage, and may not be fit to undergo general anaesthesia on multiple occasions. Hence, it is important to limit the number of procedures required to perform adequate peritoneal dialysis, considering the multiple comorbid illnesses that patients with ESKD often have.

In our study, we found that the “Santosh-PGI Hanging Loop Technique” proved to be efficacious in more than 90% of the cases, and hence can be considered apt for widespread adoption by the urologic community. The number of re-operations associated with this technique was essentially zero, reinforcing the decision to go ahead with this procedure. Quality of life, which is an important parameter in ESKD patients, was not compromised with this technique and all patients could carry out day-to-day activities with the peritoneal dialysis catheter in-situ; also, all patients could self-perform the dialysis at home without the need for expert advice, leading effectively to minimal impact on their quality of life.

REFERENCES

- 2017 USRDS Annual Data Report: Executive Summary, American Journal of Kidney Diseases. Volume 71, Issue 3, Supplement 1, 2018, Pages S1-S8, ISSN 0272-6386.
- H. M. Zakaria, “Laparoscopic management of malfunctioning peritoneal dialysis catheters,” *Oman Medical Journal*, vol. 26, no. 3, pp. 171–174, 2011.
- Kumar S, Singh S, Sharma AP, Rath M. A Novel Technique for Laparoscopic Salvage of CAPD Catheter Malfunction and Migration: The Santosh-PGI Hanging Loop Technique. *Case Rep Nephrol*. 2015; 2015:684976. doi:10.1155/2015/684976
- Tenckhoff H, Schechter H: A bacteriologically safe peritoneal access device. *Trans Am Soc Artif Intern Organs* 1968, 14:181–186.
- Bargman JM, Thorpe KE, Churchill DN. Relative contribution of residual renal function and peritoneal clearance to adequacy of dialysis: a reanalysis of the CANUSA study. *Journal of the American Society of Nephrology: JASN* 2001;12(10):2158–62.
- Mehrotra R, Chiu Y, Kalantar-Zadeh K, Bargman J, Vonesh E. Similar outcomes with hemodialysis and peritoneal dialysis in patients with end-stage renal disease. *Arch Intern Med* 2011;171(2):110–8.
- Heaf JG, Lokkegaard H, Madsen M. Initial survival advantage of peritoneal dialysis relative to haemodialysis. *Nephrology Dialysis Transplantation* 2002;17(1):112–7.
- Juergensen E, Wuerth D, Finkelstein SH, Juergensen PH, Bekui A, Finkelstein FO. Haemodialysis and peritoneal dialysis: patients' assessment of their satisfaction with therapy and the impact of the therapy on their lives. *Clinical journal of the American Society of Nephrology: CJASN* 2006;1(6):1191–6.
- Rubin HR, Fink NE, Plantinga LC, Sadler JH, Klinger AS, Powe NR. Patient ratings of dialysis care with peritoneal dialysis vs haemodialysis. *JAMA* 2004;291(6):697–703.
- Popovich RP, Moncrief JW, Decherd JF, Bomar JB, Pyle WK. The definition of a novel portable/wearable equilibrium dialysis technique (abstract) *Trans Am Soc Artif Intern Organs*. 1976; 5:64.
- Crabtree JH, Shrestha BM, Chow KM, et al. Creating and Maintaining Optimal Peritoneal Dialysis Access in the Adult Patient: 2019 Update. *Perit Dial Int*. 2019;39(5):414-436. doi:10.3747/pdi.2018.00232
- Shenouda AN, Puckett W, Burns R, Miller FJ. Acute intestinal obstruction complicating CAPD. *Perit Dial Int* 1982; 1:49