ORIGINAL ARTICLE

Comparison of Percutaneous Versus Open Surgical Techniques for Placement of Peritoneal Dialysis Catheters

Imtiyaz Wani[1], Rayees Y Sheikh[2], Muzaffar M. Wani[1], Arif Hameed[3], Ghulam M Bhat[4], Nucksheeba A Bhat[5]

[1]Department of Nephrology, SKIMS, [2]Department of Medicine, Subdivision Nephrology, SRMS IMS Bareilly.
[3]Department of Urology SKIMS, [4]Department of Internal Medicine SKIMS
[5] Department of Paediatrics, SRMS IMS Bareilly

ABSTRACT

Background: Nephrologists have used percutaneous placement of peritoneal dialysis catheters (PDCs) with or without fluoroscopic guidance. PDCs are also placed using mini-laparotomy and laparoscopic techniques by surgeons. Percutaneous PDC placement by nephrologists is a simple, non-invasive technique with minimum intraoperative morbidity. We compared operative and immediate complications of PDCs using percutaneous versus open surgical mode of insertion.

Material and Methods: Data of all patients entering into CAPD programmein our center between July2011 to July2015 was collected. A total of 377 PDCs had been inserted over 48 months in 358 patients. Of 377 catheters,224 had been inserted by percutaneous method and 153 by surgical technique.

Results: Complications related to PDC insertion by percutaneous and surgical methods were comparable. The complications encountered with catheter placement (percutaneous vs surgical) included wound hematoma (3.5 vs 2.6%;p-0.061), haemorrhagic drain (4.4 vs 3.92;p0.068), bowel injury (1.33% vs 0.65%; p 0159) and dialysate leak (2.6vs 6.5%, p 0.068). PDC placement allowed a significantly shorter hospital stay and break-in period and smaller incision compared to surgical period ($p < 0.001$ for all).

Conclusions: The early postoperative complication rate with percutaneously placed CAPD catheters by nephrologists is comparable to that with open surgical techniques but with significantly shorter hospital stay, smaller incision, shorter break-in period, and postprocedure morbidity. Percutaneous PDC placement is minimally invasive, safe, less time consuming, and dependable peritoneal access technique. JMS

Keywords: Continuous *ambulatory peritoneal dialysis, interventional nephrologists, percutaneous insertion, peritoneal dialysis catheter, surgical insertion.*
JMS: 2019; 22(1):54-57 DOI: https://doi.org/10.33883/jms.v22i2.424

INTRODUCTION

Interventional nephrology (IN) is growing fast ensuring ideal management of renal patients with effectiveness, safety and low cost for public health system. IN mainly deals with USG guided kidney biopsy, insertion of peritoneal dialysis and tunnelled haemodialysis catheters. Nephrologists can safely and successfully perform these procedures with excellent results[1,2]. PD catheters can be placed into abdominal cavity by surgeons[3], interventional radiologists[4] or interventional nephrologists[5]. Open surgical approaches include mini-laparotomy and laparoscopic placement. These surgical procedures have the disadvantage of general anaesthesia, post-operative pain, longer immobility &higher costs.

This study seeks to compare the operative and immediate complication rates following CAPD insertion by percutaneous and surgical approaches.

MATERIAL AND METHODS

Scrutiny of records of all patients entering into CAPD

Correspondence:
Dr Imtiyaz Wani, DM
Additional Professor Department of Nephrology SKIMS
Email:drimtiyazwani@gmail.com

Access this article online

Website: www.jmsskims.org

DOI: https://doi.org/10.33883/jms.v22i2.424

How to cite this article: Wani IA, Sheikh RY, Wani MM, Hamid A, Bhat GM, Bhat NA. Comparison of Percutaneous versus Open Surgical techniques for placement of Peritoneal Dialysis Catheters. jms [Internet]. 2019May27 [cited 2019May27];22(2). Available from: http://www.jmsskims.org/index.php/jms/article/view/424

Received:08-03-2019 Accepted: 11-05-2019

program between July 2011 and July 2015 atthe Department of Nephrology, SKIMS Soura revealed that 377 PDCs had been inserted in 358 patients over that period. Of the 377 catheter placements, 224 had been placed percutaneously (Group A), while 153 had been placed surgically (Group B). The two groups were compared for operative and immediate post procedure complications.

Percutaneous placement of peritoneal dialysis catheter by nephrologist

We used Seldinger technique using local anaesthesia for percutaneous insertions using guide wire and peel away sheath.

We performed the procedure using 2% lignocaine as local anaesthesia and light sedation and 1gm IV vancomycin as prophylaxis. A small paramedian incision 2-4cm long was created over the entrance site followed by blunt dissection of subcutaneous tissue up to fascia of rectus muscle. The peritoneal cavity was cannulated using 16-gauge needle from quinton catheter placement kit and filled with 500 ml of PD fluid. A 0.035-inch guide wire was introduced and introducer needle was removed. A peel away sheath and introducer were inserted over the guide wire. The introducer was removed along with the guide wire leaving the peel away sheath in situ. The PDC was advanced through the peel away sheath and directed caudally towards left iliac fossa, thus splitting the peel away sheath. The intraperitoneal segment was advanced until the proximal cuff was located in the preperitoneal space. The inner cuff of PDC was secured by a suture on the fascia of rectus muscle. An 8-12 cm subcutaneous tunnel for PDC was created with the placement of the distal cuff subcutaneously, 2cm from the exit site by using a stylet. The proximal end of PDC was pulled through the exit site and positioned in a manner that the inner cuff was located at the fascia of rectus muscle and the 2nd cuff was 2 cm away from the exit site. The original incision was then closed and PDC was flushed with 2 litres of heparinised 2.5% dialysis solution to confirm the catheter patency and examined for intra-abdominal bleeding. The line was then capped off unless there was significant blood staining of effluent. If the latter occurred hourly cycle were continued until the drained dialysate was clear.

RESULTS

Of the 377 PDCs that had been inserted in 358 patients over the study period, 224 had been placed percutaneously (Group A) while 153 had been placed surgically (Group B).Percutaneous insertion of PDCs allowed significantly smaller incision, shorter break-in period, and shorter hospital stay than the surgical insertion. The percutaneous and surgical insertion of PDCs in our cohort are compared in table1.Wound hematoma developed in 3.5% of percutaneously placed catheters and 2.6% of catheters placed by surgical technique (p 0.061). Haemorrhagic effluent was seen in 4.46% of percutaneously placed catheters vs 3.92% of surgically placed ones (p 0.068). Bowel injury occurred in 1.33% of percutaneously placed catheters and 0.65% of surgically placed catheters (p 0159). Dialysate leak occurred in 2.6% of catheters placed percutaneously and 6.5% of catheters placed by surgical technique (p 0.068).

Table 1: Comparison between Percutaneously and surgically placed PDCs

Characteristic	Percutaneous Group Group A	Surgical Group Group B	p-value
No of procedures.	224	153	
Wound hematoma	08 (3.5)	04 (2.6)	0.061
Haemorrhagic drain	10 (4.46)	06 (3.92)	0.068
Bowel injury	03 (1.33)	01 (0.65)	0.155
Bladder injury	02 (0.89)	0	
Incision size ± SD (cms)	3.866±0.304	6.483±0.65	<0.001
Break-in period ± SD (days)	5.36±1.33	14.08±1.66	<0.001
Dialysate leak	06 (2.6)	10 (6.5)	0.068
Hospital stay ± SD (days)	2.73±0.75	6.80±1.29	<0.001

Numbers in parenthesis indicate percentage.

DISCUSSION

The increasing burden of ESRD and increasing use of CAPD as a modality of treatment for ESRD has led to a growing interest in percutaneous insertion of CAPD catheters by nephrologists in recent past. [6,7]Although, this technique was traditionally reserved for patients unfit for general anaesthesia, it is now increasingly used as front-line approach in younger and healthier patients[8]. Percutaneous bedside placement of PDCs by nephrologists has been demonstrated to be safe and reliable[7]. Several innovations have been described recently. Zaman F *et al.* adopted a percutaneous approach with fluoroscopic guidance for PDC insertion and demonstrated it to be convenient and safe and showing good patency and low infection rates[5]. This technique involves the instillation of radiocontrast dye into the peritoneal cavity. A new laparoscopic technique using an extraperitoneal approach with omentopexy for PDC placement has proved to be extremely useful for preventing catheter malfunction caused by catheter tip migration, peri catheter leakage, omental wrapping and periodic catheter movement that causes abdominal pain in CAPD[3]. The use of laparoscopy, however, mandates general anesthesia and is associated with increased expenditure. With experience, the rates of peri-catheterleakage and other catheter-related complications have been shown to be relatively low in CAPD patients using percutaneous catheter placement method without abreak-in period[9]. This procedure is comparatively simpler and less invasive than other catheterplacement methods and permits immediate initiation of PD after catheter insertion, without a break-inperiod. Short hospital stay means less expenditure and earlier institution of renal replacement therapy for severely uremic patients.

Our results are in agreement with previous data and show that percutaneous PDC placement (using Seldinger technique) offers ease of insertion and cost effectiveness and can be performed as a day care procedure with a complication profile approaching or even better than that of open surgical technique and with the added advantage of early initiation of exchange without a break-in period.

Percutaneous approach being a blind technique raises the fear of major complications of visceral perforation. The bowel perforation rate of 1.3% in our study lies at the higher end of the previously reported incidence of 0-1.3%.[10-12]

With growing experience of PDC insertion, the dialysate leak and other mechanical complications aredecreasing.[9]We observed dialysate leak in only2.6% of percutaneously placed catheters compared to 6.5% of the surgically placedones. These rates of early dialysate leak fall well within the previously reported rates of 2.2 to 22%.[10,12]

Percutaneously placed PDCs require a smaller sized incision. The incision size in our study was 3.86±0.304 cm in the percutaneous group, while in the surgical group it was significantly larger at 6.48±0.65 cm. A smaller incision size resulted in less post-operative pain, fewer days of hospitalization, andlesscosts. The mean hospitalization days were2.73±0.75 days in percutaneously placed catheters as against 6.80±1.29days in surgically placed catheters(p-<0.001).

With less post procedure morbidity and smaller incision size, dialysis can be started early in percutaneously placed PDCs. The meantime of starting peritoneal dialysis in our study was 5.36±1.33 days in percutaneous group as against 14.08±1.66days in surgical group. The early initiation of dialysis allowed for early discharge and less expenses.

To conclude there was no significant difference in immediate complication rates between percutaneously and surgically placed PDCs. Percutaneously placed catheters, however, performed better with significantly shorter break-in period, smaller incision size, and shorter hospital stay and lesser morbidity and cost.

Conflicts of Interest: None

Financial Source: None

REFERENCES:

1. Beathard GA, Litchfield T. Effectiveness and safety of dialysis vascular access procedures performed by interventional nephrologists. Kidney int.1996; 66:1622-32
2. Asif A, Byers P, Viera CF, Roth D. Developing a comprehensive diagnostic and interventional nephrology program at an academic center.AmJ Kidney Dis.2003; 42:229-33
3. Comert M, Borazan A, Kulah E. A new laparoscopy technique for placement of a permanent peritoneal dialysis catheter; the peritoneal tunnelling method.SurgEndosc. 2005;19:245-8.
4. Degesys GE, miller GA, Ford KK.Tenckhoff

peritoneal dialysis catheters: the use of fluoroscopy in management. Radiology.1985;154:819-20

5. Zaman F, pervez A, Atray NK. Fluoroscopy assisted placement of peritoneal dialysis catheters by nephrologists. Semin Dial.2005;18:247-51
6. Hendersons, Brown E, Lvy J. Safety and efficacy of percutaneous insertion of peritoneal dialysis catheters under sedation and local anaesthetic. Nephrol Dial Transplant 2009; 24:3499-509.
7. Ozener C, Bihoric A, Akolglu E. Technical survival of CAPD catheters: comparison between percutaneous and conventional surgical placement techniques. Nephrol Dial transplant 2001; 16:1893-9
8. Mellotte G J, HoCA, Morgan SH, Bending MR,Eisinger AJ. Peritoneal dialysis catheters: acomparison between percutaneous and conventional surgical placement techniques. Nephrol Dial Transplan 1993:8:626-30
9. Jo YI, Shin SK, Lee JH, Song JO, Park JH. Immediate initiation of CAPD following percutaneous catheter placement without break-in period. Perit Dial Int. 2007; 27:17983.
10. Moreiras PM, Cuina L, Goyanes GR,Sobrado JA, GonlezL. Mechanicalcomplications in chronic peritoneal dialysis. ClinNephrol1999; 52:124-30.
11. Smith SA, Morgan SH, Eastwood JB. Routine percutaneous insertion of permanent peritoneal dialysis catheters on the nephrology ward. Perit Dial Int 1994; 14:284-6.
12. Allom M, Soucie JM, Macon EJ. Complications with permanent peritoneal dialysis catheters: Experience with 154 percutaneously placed catheters. Nephron 1988; 48: 8-11.