ORIGINAL ARTICLE

OUTCOME OF OPEN TENCKHOFF CATHETER INSERTIONS: 5 YEARS EXPERIENCE IN A MAJOR TERTIARY CENTRE IN CENTRAL SAUDI ARABIA

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Background: Continuous ambulatory peritoneal dialysis (CAPD) has become a popular and established form of renal replacement therapy in patients with end-stage renal disease (ESRD). The objective of this study was to analyse the outcome of open Tenckhoff catheter insertions in patients with ESRD in term of catheter related complications. **Methods**: From December 2006 to November 2011, 337 Tenckhoff catheters were placed in 305 patients with ESRD for CAPD, by general surgeons in King Saud Medical City, Riyadh, Saudi Arabia. Medical record of all these patients was reviewed retrospectively regarding the demography, causes of ESRD, catheter related complications, and their management. **Results**: Mean age of the patients was 51.2±14.5 (range, 16–87years). Majority of the patients were female 164 (53.7%). Forty three patients (14.1%) had previous abdominal surgery. Diabetic nephropathy was the commonest (51.4%) primary cause of ESRD. Ninety three insertions (27.5%) were associated with complications. Post insertion peritonitis was the commonest complication (9.2%) in our series, followed by mechanical dysfunction (8.6%). Fifty two catheters (15.4%) were removed because of different complications. Follow up ranged between 4–47 months with a mean of 21.4±11.2 months. **Conclusions:** Open surgical approach is simple, safe, and effective method of Tenckhoff catheter insertion with an acceptable complication rate, provided patients are adequately optimized and prepared for surgery.

Keywords: Continuous ambulatory peritoneal dialysis (CAPD), End stage renal disease (ESRD), Tenckhoff catheter, complications, peritonitis, mechanical dysfunction

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INTRODUCTION

Continuous Ambulatory Peritoneal Dialysis (CAPD) has become the well-established form of renal replacement therapy in patients with end-stage renal disease (ESRD). This is because of its potential advantages of more liberal dietary intake of protein, potassium and sodium, better blood pressure control, flexibility in the treatment, normal daily life, less chance of hemodynamic instability, and lower cost than hemodialysis.[1–3] Various techniques of Tenckhoff Catheter insertion have been described in literature which includes traditional open, laparoscopic, peritoneoscopic and radiological approaches. The ideal method of Tenckhoff catheter insertion remains debatable because no one has proved its superiority over other in preventing the post-operative complications.[4–6]

Traditional open approach is widely practiced worldwide for the placement of Tenckhoff catheter. Despite its widespread use, it is still associated with significant number of complications like: catheter migration, or catheter obstruction, peritonitis which subsequently requires repeated procedures, and thus increases the morbidity and prolongs the hospital stay.[1–6]

In our hospitals general surgeons are routinely inserting the Tenckhoff catheters by open techniques on the request of our nephrology team. The objective of this study was to analyse the outcome of open Tenckhoff catheter insertions in patients with ESRD in term of catheter related complications and compare our results with the current literature.

MATERIAL AND METHODS

This descriptive study (retrospective collection of data) was carried out in the department of surgery, King Saud Medical City, Riyadh, Kingdom of Saudi Arabia from December 2006 to November 2011. It included all consecutive patients of ESRD, who underwent open surgical insertion of Tenckhoff catheters for CAPD. The patients who had laparoscopic insertion were excluded from the study.

All the insertions were performed in major operation room (OR) under general or local anaesthesia and sedation according to the fitness of patients under the supervision of anaesthesiology team. These insertions were performed routinely by the training residents under the direct supervision of board certified general surgeons. A double- cuffed coiled Tenckhoff catheter was placed in the peritoneal cavity by employing about 3–5 cm long

lower midline mini laparotomy incision. The intra peritoneal portion of catheter was placed inside the pelvic cavity by holding its tip with sponge holding forceps. The inner cuff is fixed onto the peritoneal membrane and rectus sheath with absorbable suture 3/0 (Polygalactin).

Free flow of fluid inside and outside the peritoneal cavity was always established in OR. The position of the catheter tip inside the peritoneal cavity was confirmed by radiographs in OR. Once the operating surgeon was satisfied with the flow, then the catheter was tunnelled through the subcutaneous plane with the outer cuff buried about 1 cm from the designated exit site. The anterior rectus sheath was closed by polypropylene sutures. The skin was closed with skin clips or interrupted simple stitches with polypropylene sutures 3/0.

Following discharge, patients were reviewed initially at 2 weeks interval for the removal of stitches and then at one month for CAPD training by nephrology team. Peritoneal dialysis was started by the nephrologists after complete healing of the wound. These patients were reviewed retrospectively regarding their demography, causes of ESRD, history of previous surgery, complications, catheter removal, and reasons of catheter removal and management of other complications. The observed complications in this study were post-operative bleeding, catheter migration or blockage, exit site infection, subcutaneous tunnel infection and peritonitis.

Exit site infections (ESI) were treated with organism specific antibiotics and local wound care. Cases of ESI, which were not responding to antibiotics, were treated surgically under local anaesthesia. Outer cuffs were shaved off, and the wound debridement was carried out. All the wounds were left open after debridement to heal by secondary intention. Peritonitis was managed by parenteral organism specific antibiotics and interrupting the peritoneal dialysis. Catheter removal was performed in cases of mechanical dysfunction and peritonitis resistant to medical treatment. Data was collected on a *pro forma* and entered for analysis in MS-Excel.

RESULTS

Three hundred thirty seven Tenckhoff catheter insertions were performed in 305 patients over a period of 5 years. Mean age of the patients was 51.2±14.5 (range, 16–87years). Majority of the patients were females, i.e., 164 (53.7%). Forty three patients (14.1%) had previous abdominal surgery. Diabetic nephropathy was the commonest primary cause (51.4%) of ESRD (Table-1). All catheter insertions were performed by general surgeons in major operation room. Ninety three insertions (27.5%) were associated with complications. Post insertion peritonitis was the commonest complication (9.2%) in our series, followed by mechanical dysfunction (8.6%).

Mechanical dysfunction included catheter blockage with or without tip migration. Omentum entrapment around the catheters was found in all the cases of blockage. All the cases of mechanical dysfunction required repositioning of the catheter inside the pelvic cavity. Tube fixation inside the peritoneal cavity and omentopexy was performed selectively. Details are outlined in Table-2.

A total of 52 catheters were removed because of mechanical dysfunction, peritonitis, or extra abdominal leak. Eighteen (34.6%) out of 52 catheters were removed because of peritonitis resistant to medical therapy. No death was directly attributed to the surgical technique. Follow up ranged between 4–47 months with a mean of 21.4±11.2 months.

Table-1: Causes of end stage renal disease (ESRD)

Causes	Number	Percentage
Diabetic nephropathy	157	51.5
Glumerulonephritis	69	22.6
Hypertensive nephropathy	57	18.7
Chronic Py elonephritis	13	04.3
Polycystic kidney disease	05	01.6
Others	04	01.3
Total	305	100

Table-2: Catheter related Complications

Complications	Number	Percentage
Catheter blockage	18	5.3
Catheter obstruction with tip migration	11	3.3
Exit site infection & Tunnel infection	15	4.5
Main wound infection	09	2.6
Extra abdominal Leak	06	1.7
Post-insertion peritonitis	31	9.2
Hemoperitoneum	03	0.9
Total	93	27.5

DISCUSSION

Continuous ambulatory peritoneal dialysis (CAPD) is one of the popular treatment options for ESRD, which is achieved by inserting a Tenckhoff catheter inside the pelvic cavity.[3,7] The open surgical method is one of the most commonly used and traditional technique worldwide for Tenckhoff catheter insertion. Many studies have proved it as a safe and effective technique, because of direct visualization of peritoneal cavity and less chance of iatrogenic intra peritoneal visceral injuries.[3,4,8–11] However, still it is associated with significant risk of mechanical outflow obstruction and other septic complications like exit site infection, tunnel infection and peritonitis. These complications usually resulted into the removal of catheter by another surgical intervention in OR.[1,12]

Malfunctioning of PD catheter is a common problem, which accounts for 4–34.5% of the

complications in literature.[1,3,4,8,13] We encountered mechanical dysfunction of the catheter in 8.6% of the total insertions, which is in the reported range.[1,3,4,8,13] The common causes of mechanical dysfunction are omentum wrapping, catheter tip migration, and adhesion. We observed catheter tip migration in our 11 cases (3.2%). Omental wrapping was noticed in all the cases of catheter obstruction. Some authors suggested performing omentopexy or omentectomy while placing the catheter to prevent the mechanical obstruction.[3,14–16] Omentectomy showed promising results compared to omentopexy in literature[3] but that could increase the magnitude of surgery in moribund patients.

Catheter related infections, like peritonitis, and exit site infection are other principal complications leading to the catheter loss. Post insertion peritonitis was the commonest complication (9.2%) in our series with the mean follow up of 21.4 months. Liu WJ *et al*[4] reported a very low incidence of peritonitis (2.9%) within one month and they attributed it to the routine practice of povidone body scrub 2 days before catheter insertion in addition to the prophylactic intravenous cloxacilin. Tiong HY *et al*[1] reported 6% of early peritonitis in their series while the peritonitis after one month accounted for 84% of the total late complications (26%). We believe this difference in the incidence of peritonitis is mainly because of the length of follow up period in different studies in addition to other factors.

Tiong HY *et al*[1] found the presence of distant septic foci at the time of insertion, glomerulonephritis, previous abdominal surgery and prolong surgical time, the major risk factors for developing the early peritonitis. Late peritonitis was generally associated with malnutrition, poor catheter care and improper use of aseptic technique during dialysis. Therefore multi-disciplinary approach between surgeons, nephrologists is required to optimize these factors prior to surgery in minimizing the incidence of septic complications.

We encountered an exit site and tunnel infection in 4.5% of our insertions which is in the reported range of 0–11.8%.[1,3,4,17] Majority of these cases were managed by medical therapy and local care of wound with povidone dressing. Only few cases required wound debridement and shaving of the outer cuff. Yang PJ *et al*[3] used a salvage technique to rescue the infected catheter. They found it a simple and safe technique that could preserve the functioning conduit, avoiding all the complications of temporary haemodialysis and removal of old and placement of new catheter.

With the advancement in minimally invasive surgery, Laparoscopic catheter insertion has become a routine procedure in many centres. Many authors advocated laparoscopic placement of catheter to reduce the incidence of mechanical and septic complications, with the added advantages of minimally invasive approach.[13–19] Few surgeons in our hospital have also started the laparoscopic placement of Tenckhoff catheter in selected group of patients, but a majority is still using the open technique.

This approach is particularly useful in patients who have previous abdominal surgery. Post-operative intra-abdominal adhesions increase the risk of catheter tip malposition, catheter migration or kinking as well as tube blockage. Therefore in these patients, laparoscopy has a useful role in assessing the degree of adhesions, performing the adhesiolysis and accurate placement of catheter tip.[17] However, laparoscopic approach has been associated with some disadvantages such as higher cost, longer operative time, and higher anaesthesia risk under general anaesthesia and long learning curve. Moreover, in two randomized controlled trials, Jwo SC *et al*[20] and Wright MJ *et al*[21] showed no significant difference in complication rate, catheter survival, pain score, analgesia requirement, and length of hospital stay between open and laparoscopic procedure.

Our study is limited by its retrospective design and relatively short follow-up for evaluating the risk of catheter related peritonitis. We suggest conducting a prospective randomized controlled trial with adequate follow up to determine the real incidence of catheter related peritonitis and other associated complications. Moreover the advantages and the safety of laparoscopic insertions need to be evaluated further by such trial before labelling it a standard practice.

CONCLUSION

The traditional open surgical approach is simple, safe, and effective method of Tenckhoff catheter insertion with an acceptable complication rate, provided the patients are adequately optimized and prepared for surgery. It should be the first choice for primary catheter insertion in most of the patients with no previous abdominal surgery.

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