ABSTRACT

OBJECTIVE: To analyze the outcome of open Tenckhoff catheter insertions in patients with ESRD in term of catheter related complications.

STUDY DESIGN: A retrospective descriptive study.

PLACE AND DURATION: From 1st December 2006 to 30th November 2011 at King Saud Medical City, Riyadh, Saudi Arabia.

METHODOLOGY: Three hundred thirty seven Tenckhoff catheters were placed in 305 patients with ESRD for CAPD, by general surgeons 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, 16-87 years). Majority of the patients were female (53.7%). Total of 14.1% (n=43) 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 to 47 months with a mean of 21.4±11.2 months.

CONCLUSIONS: The 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.

KEY WORDS: Continuous ambulatory peritoneal dialysis (CAPD), End stage renal disease (ESRD), Tenckhoff catheter, Complications, Peritonitis, Mechanical dysfunction

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.4,5 Traditional open approach is widely practiced world wide for the placement of Tenckhoff catheter. Despite its widespread use, still it is 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.6,7

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 analyze 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.

METHODOLOGY

This retrospective descriptive study 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 anesthesia and sedation according to the fitness of patients under the supervision of anesthesiology 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 tunneled 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 was 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 anesthesia. 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 the proforma and entered on spread sheet of Microsoft excel software for calculation of means and standard deviation.

### TABLE - I: CAUSES OF END STAGE RENAL DISEASE (ESRD) (n=305)

<table>
<thead>
<tr>
<th>Causes</th>
<th>N</th>
<th>% age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetic nephropathy</td>
<td>157</td>
<td>51.5</td>
</tr>
<tr>
<td>Glumerulonephritis</td>
<td>69</td>
<td>22.6</td>
</tr>
<tr>
<td>Hypertensive nephropathy</td>
<td>57</td>
<td>18.7</td>
</tr>
<tr>
<td>Chronic Pyelonephritis</td>
<td>13</td>
<td>04.3</td>
</tr>
<tr>
<td>Polycystic kidney disease</td>
<td>05</td>
<td>01.6</td>
</tr>
<tr>
<td>Others</td>
<td>04</td>
<td>01.3</td>
</tr>
<tr>
<td>Total</td>
<td>305</td>
<td>100</td>
</tr>
</tbody>
</table>

### TABLE - II: CATHETER RELATED COMPLICATIONS (n=305)

<table>
<thead>
<tr>
<th>Complications</th>
<th>N</th>
<th>% age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catheter blockage</td>
<td>18</td>
<td>5.3</td>
</tr>
<tr>
<td>Catheter obstruction with tip migration</td>
<td>11</td>
<td>3.3</td>
</tr>
<tr>
<td>Exit site infection &amp; Tunnel infection</td>
<td>15</td>
<td>4.5</td>
</tr>
<tr>
<td>Main wound infection</td>
<td>09</td>
<td>2.6</td>
</tr>
<tr>
<td>Extra abdominal Leak</td>
<td>06</td>
<td>1.7</td>
</tr>
<tr>
<td>Post-insertion peritonitis</td>
<td>31</td>
<td>9.2</td>
</tr>
<tr>
<td>Hemoperitoneum</td>
<td>03</td>
<td>0.9</td>
</tr>
<tr>
<td>Total</td>
<td>93</td>
<td>27.5</td>
</tr>
</tbody>
</table>

### RESULTS

Three hundred thirty seven Tenckhoff catheter insertions were performed in 305 patients over the period of 5 years. Mean age of the patients was 51.2± 14.5(range, 16-87 years). Majority of the patients were female (53.7%). Forty three patients (14.1%) had previous abdominal surgery. Diabetic nephropathy was the commonest primary cause (51.4%) of ESRD. The detail of the rest is shown in Table - I. 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. The detail of other complications is outlined in Table - II.

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 to 47 months with a mean of 21.4±11.2 months.

### 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. 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. Malfunctioning of PD catheter is a common problem, which accounts for 4 to 34.5% of the complications in literature. We encountered mechanical dysfunction of the catheter in 8.6% of the total insertions, which is in the reported range. 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. Omentectomy showed promising results.
compared to omentopexy in literature but that could increase the magnitude of surgery in moribund patients.

Catheter related infections, like peritonitis, and exit site infection are another 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 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 cloxacillin. Tiong HY et al 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 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 multidisciplinary 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 to 11.8%. 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 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 hemodialysis 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 centers. Many authors advocated laparoscopic placement of catheter to reduce the incidence of mechanical and septic complications, with the added advantages of minimally invasive approach. Few surgeons in our hospital have also started the laparoscopic placement of Tenckhoff catheter in selected group of patients, but the majority is still using the open technique.

This approach is particular useful in patients who have previous abdominal surgery. Post operative intra abdominal adhesions increase the risk of catheter tip mal position, 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 adhesiolsis and accurate placement of catheter tip. However, laparoscopic approach has been associated with some disadvantages such as higher cost, longer operative time, and higher anesthesia risk under general anesthesia and long learning curve. Moreover, in two randomized controlled trials, Jwo SC et al and Wright MJ et al 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 labeling 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.

**REFERENCE**


