The views presented reflect those of the author/presenter and do not necessarily reflect those of ASDIN nor serve as an endorsement of safety, efficacy or applicability of said procedure.

Recently Available Tunneled Peritoneal Catheters
Combinations of IP and EP designs.

Peritoneal Dialysis Catheter Insertion and Removal
ASDIN Advanced Course
Washington, DC
February 15, 2013
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In patients with panniculus the proper exit is always above anterior superior iliac spine (Dr. John Crabtree)

Checklist Before Implantation or Removal of PD Catheter

- Off anti-platelet drugs for 5 days
- Off coumadin for at least 3 days and protime INR <2 at time of procedure
- Coverage with enoxaparin for those with prosthetic heart valve or serious thrombotic event history
- Platelet count > 60,000/mm³
- No solid food from midnight on day of procedure
- NPO for 2 hours before procedure (3 hours for diabetics) but BP and cardiac meds should be taken on day of procedure
- Patient should have had normal BM in past 24 hours
- Patient urinates the morning of the procedure (if making urine)
- Patient is comfortable lying flat in bed, physiologically stable and alert
- Prophylactic antibiotic given within one hour of starting placement procedure.

Four Methods of Placement of Tunneled PD Catheters

1. Dissection (surgical)
2. Peritoneoscopic (local procedure, with 2.2 mm diameter scope), with ultrasound examination
3. Seldinger technique (further developed to fluoroscopic technique)
4. Laparoscopic (general anesthesia with 5 or 10 mm diameter scopes)

Methods of placing PD Catheters:

Surgical (dissection)

Peritoneoscopic Placement with 2.2 mm diameter scope, Single Puncture Technique

Steps of Implantation
- Y-Tac Peritoneoscopic System

Start with ultrasound of abdominal wall, look for fat depth, rectus border, movement visceral surface, epigastric arteries

Video Courtesy of Dr. Rajeev Narayan, San Antonio, TX
Sometimes the ultrasound can show some real surprises. In this patient with SVC occlusion, collateral subcutaneous venules penetrated the rectus and formed preperitoneal lakes, as shown in the non-contrast CT’s above and to right.

**Purpose of viewing peritoneum through the peritoneoscope:**

* confirm intraperitoneal position of cannula after first puncture
* after air inflation, assure Quill® guide is adjacent to the parietal peritoneum
* find direction for Quill® guide that avoids adhesions and large loops of bowel
* direct catheter through Quill® along previously inspected course
* observe previously placed catheters to determine if there were mechanical problems
* photograph unusual findings using high intensity light source

**Parietal and Visceral Peritoneal Separation**
Clear Space at 15 cm Distance from Deep Cuff Site
Right or Left of Bladder
Parietal Peritoneal Adhesions

Inspect Prior PD Catheters and Determine Cause of Failure

Inspect Deep Cuff and Peritoneal Entry Sites
Deep cuff in rectus

Kaplan-Meier plot of Tenckhoff catheter survival according to the technique of placement, peritoneoscopic versus surgery.

Kaplan-Meier curves for catheter survival of peritoneoscopically (Scope) and surgically (Surgery) placed peritoneal dialysis catheters in patients receiving their first PD catheter.

Disc-ball catheters placed by dissection also do very well

Twardowski PDI 1998

Figure 2 — Probability of survival of presternal and abdominal catheters. Numbers of catheters at risk are shown.

Tenckhoff catheters placed by dissection also do very well. The more the scars, the more helpful are peritoneoscopic or laparoscopic techniques.

**Catheter Burying Procedure**
- Also called "Moncrief-Popovich Technique" for burying catheters
- The external limb of the catheter is buried under the skin at the time of the implantation procedure.
- The external limb is exteriorized weeks to months later when dialysis is needed.

**Implantation Tools**
**Embedding™ Tool**
- The only medical device specifically FDA-approved for subcutaneously burying PD catheters.
- All other methods of burying PD catheters use off-label tools.
- Curved handle, plastic (A), with threaded tip (B)
- Plug, titanium (C)
- Cap, titanium (D)

Alternate approach: after peritoneoscopy, I reassemble the Quill®, Cannula and Trocar embed the catheter through the single exit site.

NOTE: not an FDA approved use of the Y-Tec components, and catheter must be shortened, filled with heparin and plugged.
Blind (needle, guidewire and splitsheath)

Technique Survival in this retrospective study favored placement of PD catheters by blind Seldinger technique versus surgical technique. However, patients selected for surgery had a higher prevalence of:

- PCKD (15% vs. 3%)
- Previous abdominal surgery (48% vs 9%)
- Previous PD catheter (33% vs 3%)

Fluoroscopic technique can combine with Y-Tec guide for advancing catheter and implanting cuff in rectus muscle.
Dye appearance when cannula tip is pre-peritoneal

Sometimes the dye moves only in a restricted space due to adhesions or a limited peritoneal space.

Guidewire advanced into peritoneum, loop crosses midline

Quill Guide®/cannula/7 French dilator in abdomen 0.035" guidewire

Peritoneogram through properly placed PD catheter

Complication rates are low with fluoroscopic technique, but in a few patients the technique doesn’t allow successful catheter placement.
In a randomized study, fluoroscopic placement gave equal long-term PD catheter survival as laparoscopic placement, but with fewer complications (esp peritonitis).

Peritoneogram of PD catheter placed more deeply in the pelvis, a more complicated space than that behind the inguinal ligament.

With either peritoneoscopic or fluoroscopic placement, physician must be cognizant of images representing intraperitoneal, extraperitoneal, and intraluminal placement of the cannula.

Fluoroscopic and Sonographic Guidance to Place Peritoneal Catheters: How We Do It

Placement of needle into the cecum.
Early catheter success rate is 98% or above in published series. At one RMS center beginning placements just after training with fluoroscopic placement mostly, early success was 99%.

Laparoscopic Placement with Omentopexy, Downward Tunnel, and Adhesiolysis Also Gives Excellent Results

![Laparoscopic Placement with Omentopexy, Downward Tunnel, and Adhesiolysis](image)

Incidence of Complications Over Lifespan of Catheter by Placement Method; compilation of studies

<table>
<thead>
<tr>
<th>Placement method</th>
<th>Author (year(s))</th>
<th>Mean follow-up (months)</th>
<th>Infectious complication (%)</th>
<th>Outflow failure (%)</th>
<th>Subcutaneous leaks (%)</th>
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<tbody>
<tr>
<td>Blind or Seldinger Technique (9 studies)</td>
<td></td>
<td></td>
<td>0.23</td>
<td>0.16</td>
<td>0.11</td>
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<td>Dissective or Surgical Technique (10 studies)</td>
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<td>Peritoneoscopic/Laparoscopic*Technique (9 studies)</td>
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<td>0.07</td>
<td>0.04</td>
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</tbody>
</table>

*Survival same for laparoscopy and surgically placed PD catheters, Drummond Dialysis Year Rev, 2004

![Incidence of Complications Over Lifespan of Catheter by Placement Method](image)
What is the best technique for placing tunneled PD catheters?

- All techniques can be successful, as judged by 80% or more of PD catheters functional at one year after placement.
- Complication rates are similar for all techniques.
- Skill and experience of the physician is more important than the technique used to assure PD catheter long-term function.
- Fluoroscopic and peritoneoscopic techniques performed by Interventionalists have success equal to or better than surgical placement.
- Laparoscopic and peritoneoscopic techniques are most helpful in patients with multiple prior surgeries, to determine extent of adhesions.
- Laparoscopy and dissection techniques require general anesthesia, which adds risk and morbidity to the placement procedure.
- Laparoscopic placement provides benefit versus surgical placement only if it includes omentopexy (when indicated) and longitudinal tunnel of the catheter through the rectus.

Removal of Permanent Tunneled Peritoneal Dialysis Catheters

1. This step in removal of the PD catheter loses encircling incision surrounding the cuff on catheter, and exposes the portion for removal. A distal cut incision is made from around the cuff first, then an incision at catheter. The cuff is then grasped with hemostats and the cuff is pulled to the hemostats. The distal portion may be "kicked" with a suture to make it easier to find. When removing the superficial cuff...

2. PD catheter with intact cuff in position in the subcutaneous tunnel. It may be easier to visualize, and the superficial cuff...

3. PD catheter and tunnel are elevated and the surrounding tunnel is opened with cautery. The catheter is then grasped with hemostats and the cuff is pulled to the hemostats. The distal portion may...

4. Laparoscopic placement provides benefit versus surgical placement only if it includes omentopexy (when indicated) and longitudinal tunnel of the catheter through the rectus.
4. The tunnel is grasped with hemostats and cut by cautery/lauretto to reach the deep cuff.

5. The deep cuff is elevated by pulling on the catheter and cautery used to cut the fibrous adhesions of the cuff to surrounding muscle tissue. Some connections may bleed and should be clamped and cauterized.

6. The remaining connection of the deep cuff to the peritoneum is dealt with cautery. The catheter is removed and the percutaneous suture is pulled tight and tied.

7. With upward traction on the catheter and deep cuff, a 2-0 Vicryl suture is placed in 3-0 point percutaneously around the catheter.

8. While holding tension on the first suture, a second percutaneous suture is placed around the site of the deep cuff.
Why Nephrologists Place Peritoneal Catheters

- Improved or at Least Equal Outcomes to Other Techniques
- Improved Diagnosis: Doing it Adds Understanding
- Continuity of Care: Procedure Room to Ward to Dialysis Unit to Procedure Room
- Availability to Perform Procedures in Timely Manner
- Improved Treatment Options for Every Patient
- Peritoneal Dialysis Program will grow
- Motivation for Continued Improvement of Performance and Procedure and Devices
- Satisfaction in Training and Career
- An Economically Neutral to Positive Step

Nephrology PD Catheter Placement Leads to Growth of the PD Population

Graph showing the growth of F0 and PD in Hospital setting after meeting (no integrated care approach to CAPS).
Here’s to health and happiness…