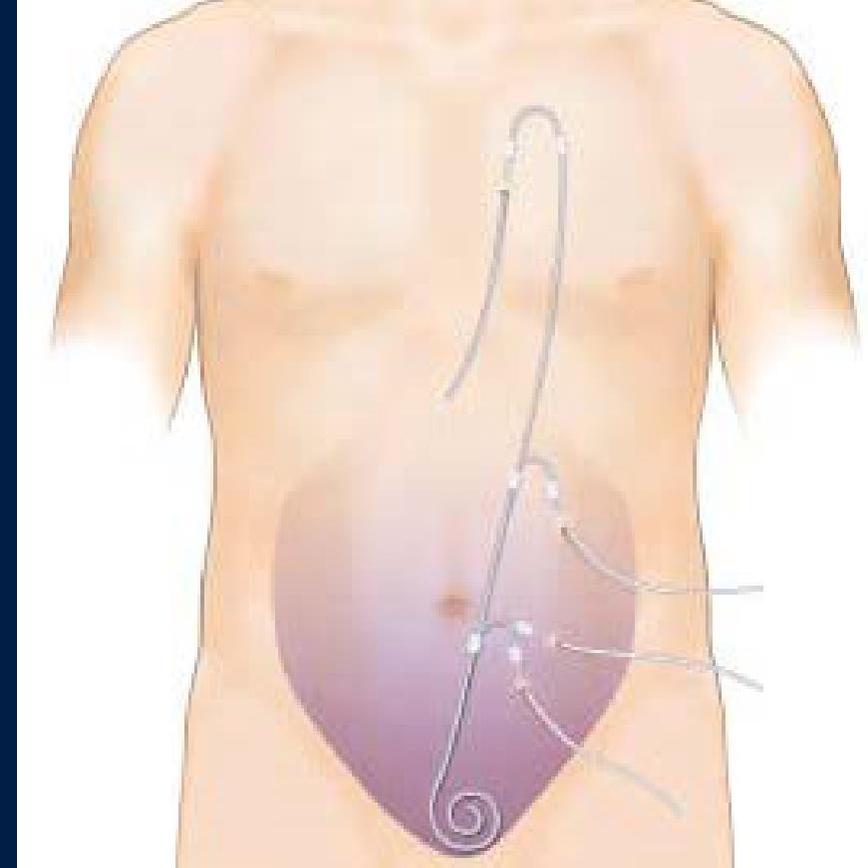


# PERITONEAL DIALYSIS CATHETER INSERTION TECHNIQUES

PERITONEAL DIALYSIS  
TRAINING PROGRAM



**Medtronic**  
Further, Together

# DISCLAIMER

Medical techniques and procedures described **do not** represent **ALL** medically acceptable protocols, nor are they intended as a substitution for the physician's experience and judgement in treating any specific patient<sup>1</sup>

<sup>1</sup> Argyle™\* IFU, 2018

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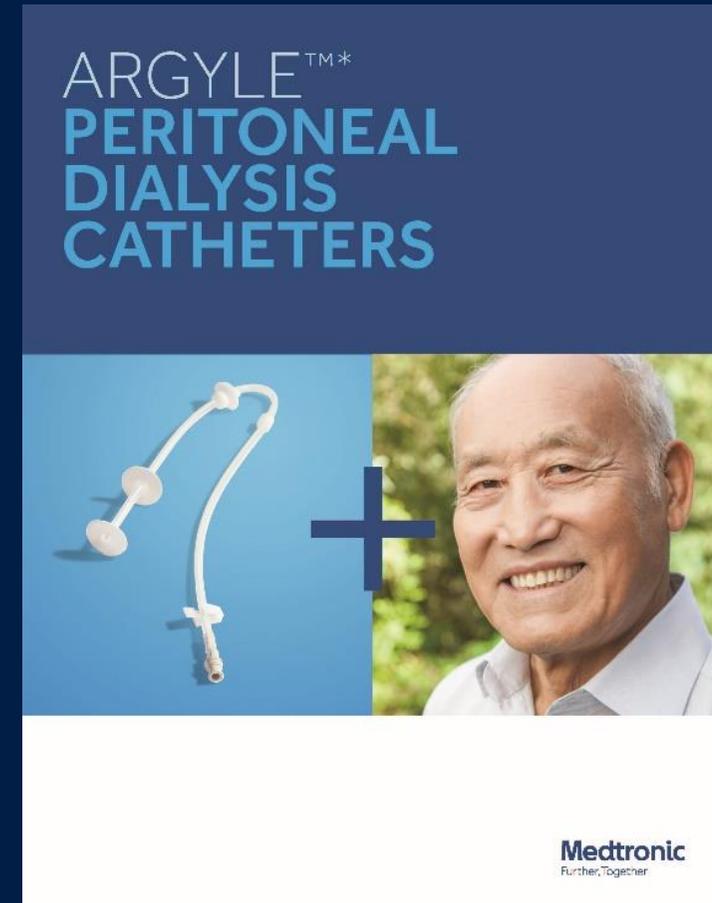
# OVERVIEW

This presentation will review techniques available for insertion of peritoneal dialysis (PD) catheters and summarize current evidence on outcomes.

- Importance of the insertion procedure
- Who inserts PD catheters?
- Insertion techniques with corresponding procedure
- Outcomes of insertion techniques
- General warnings and precautions

# INDICATIONS FOR USE<sup>1</sup>

- Argyle™\* catheters are indicated for both **acute** and **chronic** peritoneal dialysis
- Catheters can be inserted using multiple options, including:
  - **Open** technique
  - **Laparoscopic** technique
  - **Percutaneous surgical** techniques



<sup>1</sup> Argyle™\* IFU, 2018

# CONTRAINDICATIONS TO PD CATHETER PLACEMENT/INSERTION

## ABSOLUTE AND RELATIVE<sup>1,2</sup>

### ABSOLUTE

- Documented reduction in PD membrane function, decreased peritoneal capacity or unresolved peritonitis
- Inability of patient to safely use equipment daily or have suitable assistant
- Severe protein malnutrition and/or proteinuria > 10g/day
- Active intraabdominal, abdominal wall or skin infection
- Extensive intra-abdominal adhesions
- Frequent episodes of diverticulitis
- Uncorrectable mechanical defects
- Severe respiratory insufficiency

NOTE: catheter not intended for Tenckhoff trocar method of insertion, nor use for any purpose other than indicated

### RELATIVE

- Decreased capacity of peritoneal cavity; lack of integrity of the abdominal wall
- Obesity; possible inadequate solute or ultrafiltration clearance
- Intraabdominal foreign body (e.g. a 4-month waiting period recommended for abdominal aortic aneurysm graft repair)<sup>1</sup>
- Ostomy; pre-sternal catheter possible option
- Inability to tolerate general anesthesia
- When catheter is used with the titanium accessories, this catheter would then be considered MR Conditional

NOTE: catheters have been inserted in 'Relative' situations; contraindications to be evaluated by physician on an individual basis.

<sup>1</sup>Argyle™\* IFU, 2018

<sup>2</sup>Haggerty, et al., 2014

# PERITONEAL DIALYSIS

## CATHETER INSERTION PROCEDURES

- Catheter insertion procedure is a key factor in risk of early infections<sup>3</sup>
- While catheter type has not been linked to risk of complications, improper insertion may increase risk of complications<sup>3</sup>
- With ultrasound (US) and fluoroscopic guidance, percutaneous insertion is a reasonable alternative to surgical placement<sup>4</sup>
- Laparoscopic approach permits proactive techniques such as selective omentopexy and adhesiolysis<sup>2</sup>
- Similar technical outcomes and patency rates for percutaneous insertion with ultrasound and fluoroscopic guidance compared to catheter placed by laparoscopy<sup>4</sup>

<sup>2</sup>Haggerty, et al., 2014

<sup>3</sup>Bender, et al., 2006

<sup>4</sup>Abdel-Aal, et al., 2014

# PD CATHETER INSERTION TECHNIQUES<sup>2</sup>

## SURGICAL METHODS

**Open Surgical  
(27%)**

**Laparoscopic  
(50%)**  
Basic Advanced

## PERCUTANEOUS METHODS

**Peritoneoscopic  
(<1%)**

**Fluoroscopic  
Guided  
Percutaneous  
(% not available)**

<sup>2</sup> Haggerty, et al. 2014

# WHO INSERTS PD CATHETERS?

- General Surgeons
- Vascular Surgeons
- Interventional Radiologists
- Interventional Nephrologists
- Transplant Surgeons
- Nephrologists



- In the United States placement is most commonly performed by surgeons<sup>5</sup>
- Placement by interventional radiology is increasing in popularity due to its cost effective approach to percutaneous, minimally invasive placement of PD catheters<sup>4</sup>

<sup>4</sup> Abdel-Aal, et al. 2014

<sup>5</sup> Crabtree, 2010

# CLINICAL PRACTICE GUIDELINES FOR PERITONEAL ACCESS

## RECOMMENDS THE FOLLOWING

- Implantation technique<sup>1,6</sup>
  - Local expertise at individual centers should govern the choice of method of PD catheter insertion
- Access team<sup>6</sup>
  - Each center should have a dedicated team involved in the implantation of PD catheters
- Facilities<sup>6</sup>
  - A dedicated area should be used for catheter insertion with appropriate staffing, suction, oxygen, and patient monitoring facilities
- Training of inserting clinicians<sup>1,6</sup>
  - PD catheter insertion should be performed by trained individuals and not delegated to inexperienced or unsupervised operators
- Quality audit<sup>6</sup>
  - Centers should audit PD catheter insertion outcomes on a regular basis, at least annually

<sup>1</sup> Argyle™\* IFU, 2018

<sup>6</sup> Figueiredo, et al. 2010

# PERIOPERATIVE PLANNING AND PREPARATION<sup>7</sup>

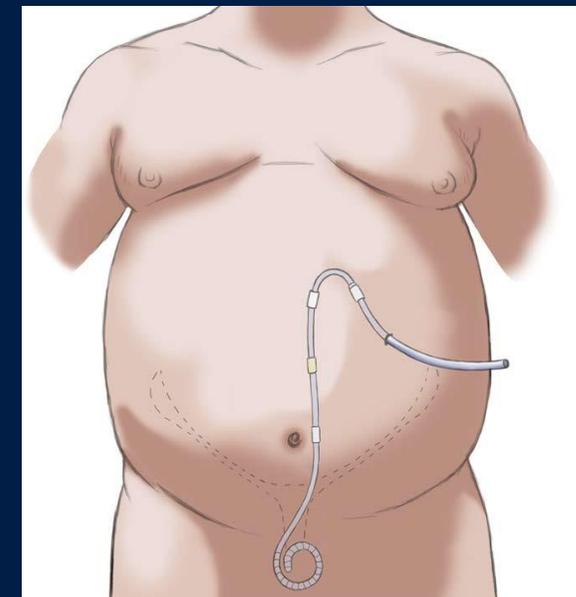
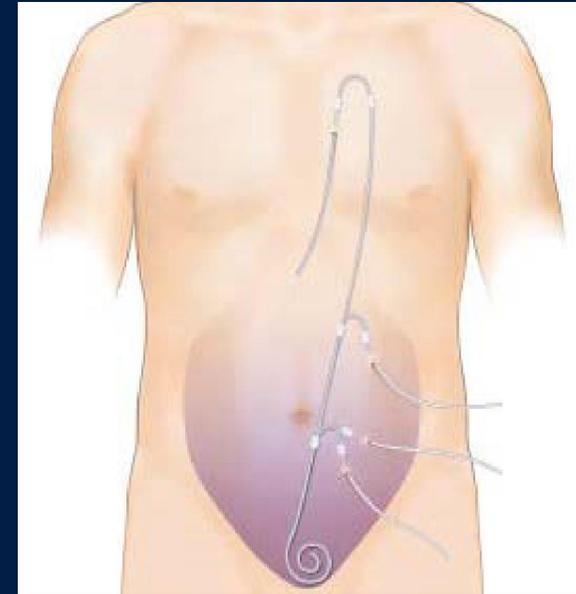
## PATIENT LAND MARKING

Consider multiple factors:

- Body habitus
- Belt line location (varies greatly)
- Surgical scars
- Hernias/stomas
- Incontinence
- If a transplant candidate put catheter on the left side
- Patient preferences (right or left-handed, desire for deep baths)

Examination should take place when clothed and in both a sitting and lying position<sup>2,7</sup>

- **NOTE:** Insertion into the abdomen is the **same technique regardless** of implantation standard or catheter system



Images property of Medtronic

<sup>2</sup> Haggerty, et al. 2014

<sup>7</sup> Crabtree et al, 2005

# PERIOPERATIVE PLANNING AND PREPARATION<sup>7</sup>

## PLAN SURGICAL INCISION

- A. Surgical site correlates to the location of the **deep cuff**. Determined by:
  - Visualizing the highest level of the intraperitoneal coil when aligned with the upper border of the symphysis pubis
  - **Make note of the deep cuff position**
- B. Measurement ensures coiled tip is located deep in the true pelvis<sup>1</sup>
- C. Plan for a **paramedian incision** location; catheter will traverse the rectus sheath and muscle on the way to the peritoneal cavity
- D. Avoid epigastric vessels; the center of the incision should be 3 cm lateral of midline and toward the medial aspect of the rectus sheath

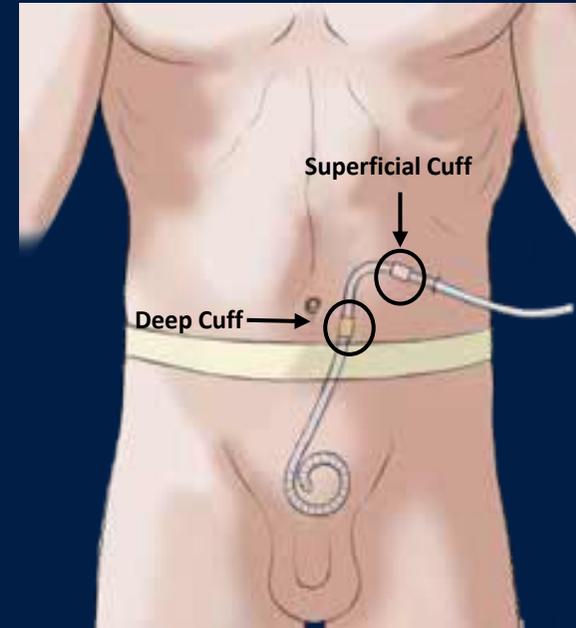


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<sup>1</sup> Argyle™\* IFU, 2018

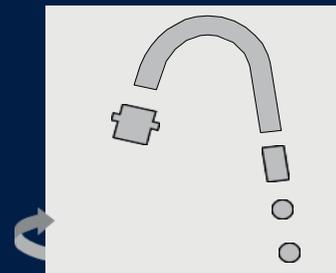
<sup>7</sup> Crabtree et al, 2005

# PERIOPERATIVE PLANNING AND PREPARATION<sup>7</sup>

## PLAN SUBCUTANEOUS TUNNEL TRACK

- A. Tunnel should track either **lateral** or **downward facing** to avert pooling of cutaneous debris, water or sweat into exit track<sup>6</sup>
- B. For swan-neck type catheter, tunnel track **must** follow the shape of the catheter precisely
- C. To prevent superficial cuff extrusion through the exit-site, a preformed swan neck catheter exit-site is planned **2-3 cm beyond the superficial cuff, or 4 cm from the exit wound for a straight catheter.** This step helps to manage possible catheter memory
- D. Care must be taken to avoid excessive bending of a straight Tenckhoff style catheter in the tract
- E. Stencils and algorithms can be used to map out the tunnel/exit track

### Stencil



Stencil as shown is for use on left side of patient.

Turn over as indicated to use on right side.

Figure 1. Illustration retrieved from Argyle™\* IFU<sup>1</sup>

### 3-Step Algorithm for Lateral Tunnel and Exit Site Design

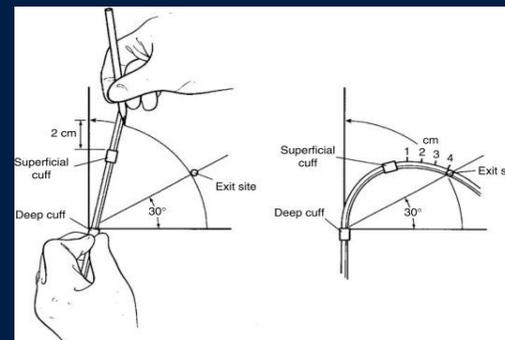


Figure 2. Reprint from Kidney International, 70, Crabtree J H. Selected best demonstrated practices in peritoneal dialysis access, 527-537, (2006), with permission from Elsevier.<sup>8</sup>

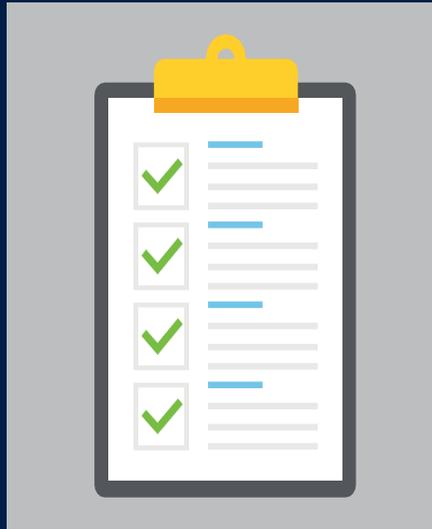
<sup>1</sup> Argyle™\* IFU, 2018

<sup>7</sup> Crabtree et al, 2005

<sup>8</sup> Crabtree, 2006

# PERIOPERATIVE PLANNING AND PREPARATION

## PATIENT PREPARATION



- A. Explanation of procedure to the patient<sup>1,7</sup>
- B. Enema or bowel prep may be prescribed<sup>1,7</sup>
- C. Day of insertion shower with a chlorhexidine soap<sup>7</sup>
- D. Remove body hair as requested...the use of electric clippers may be suggested<sup>1,7</sup>
- E. Patients instructed to empty bladder; Foley catheter an option if bladder not emptied<sup>1,7</sup>
- F. Prophylactic antibiotic administration suggested<sup>1,2,7</sup>

<sup>1</sup> Argyle™\* Dialysis Catheter and Kits IFU, 2018

<sup>2</sup> Haggarty et al. 2014

<sup>7</sup> Crabtree et al, 2005

# OPEN INSERTION TECHNIQUE

# OPEN INSERTION<sup>2</sup>

## ADVANTAGES AND DISADVANTAGES

All steps performed under direct vision and securely closing each layer of the abdominal wall to prevent a dialysate leak

Advantages	Disadvantages
Local,conscioussedation, or general anesthesia	No direction visualization of intra-abdominal structures
Does not require special equipment	Requires surgical scheduling/availability of surgical suite
Direct visualization of peritoneum	Higher leak and dysfunction rates compared to guided percutaneous and advanced laparoscopic
Permits omentectomy (recommended in pediatric patients) <sup>1</sup>	

<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggerty, et al. 2014

# OPEN SURGICAL INSERTION PROCEDURE<sup>1,9</sup>

1. Prepare equipment, sterile fields, patient, etc.
2. Persons handling components should perform surgical scrub and don appropriate surgical attire
3. Insertion through the rectus sheath and muscle
  - Transverse **3-4 cm** incision through skin and subcutaneous tissue-ensure hemostasis
  - Anterior rectus sheath exposed; more local anesthetic may be used
4. Make a transverse incision
  - Separate the rectus muscle down to posterior rectus sheath
  - Place a purse string suture through the posterior rectus sheath, transversalis fascia and peritoneum
5. Incision of peritoneum
  - Make a small incision (**~5-6 mm**) in the peritoneum to accommodate the catheter

Figure 3.  
Straight or  
curled  
configuration  
of PD  
catheter

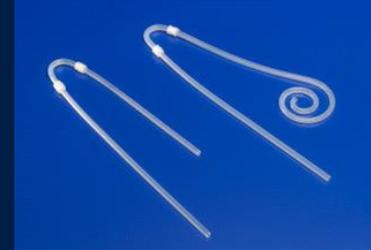


Figure 4.  
Retrieved  
from PD  
Insertion  
Guide<sup>9</sup>

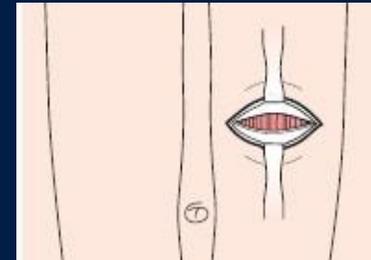
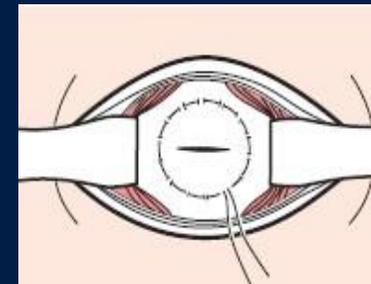


Figure 5.  
Retrieved  
from PD  
Insertion  
Guide<sup>9</sup>



<sup>1</sup> Argyle™\* IFU, 2018

<sup>9</sup> PD Insertion Guide, 2015

# OPEN INSERTION PROCEDURE CONTINUED

- **NOTE:** Immediately prior to insertion, soak the catheter in sterile saline; squeeze cuffs to expel air<sup>1,2,9</sup>

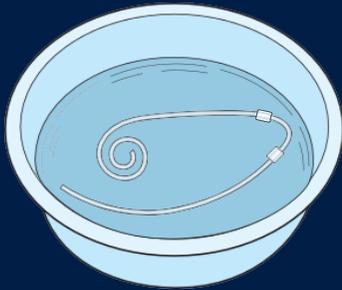
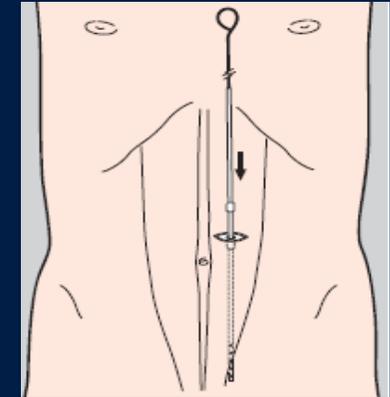
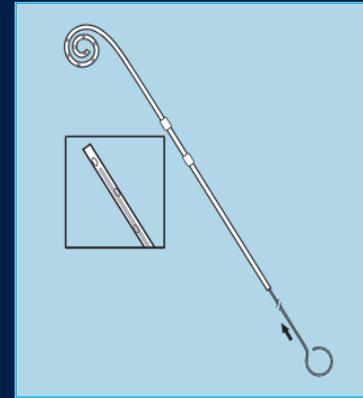


Figure 6. Retrieved from PD Insertion Guide<sup>9</sup>

Figures 7 & 8. Retrieved from PD Insertion Guide<sup>9</sup>



6. Thread catheter onto **blunt** stiffening stylet keeping some of the catheter over the stylet to protect the bowel<sup>1</sup>
  - Insert catheter caudally into deep pelvis if no resistance<sup>1</sup>
  - Positioning can be confirmed for<sup>1</sup> :
    - conscious patient when 'rectal pressure' felt
    - unconscious patient when the catheter  $\frac{1}{2}$  to  $\frac{3}{4}$  inserted
  - Remove stylet and push catheter into the pelvis<sup>1</sup>

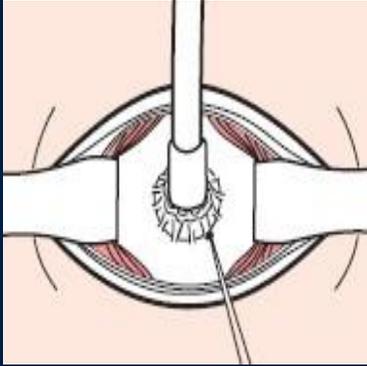
<sup>1</sup>Argyle™\* IFU, 2018

<sup>2</sup>Haggerty, et al. 2014

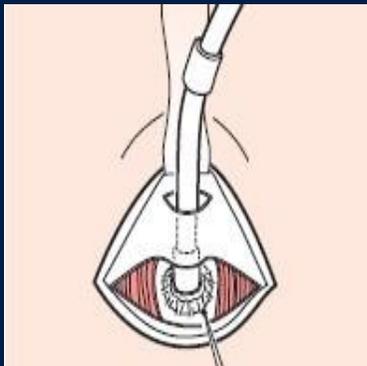
<sup>9</sup>PD Insertion Guide, 2015

# OPEN INSERTION PROCEDURE<sup>1</sup>

## CONTINUED



Figures 9 & 10.  
Retrieved from  
PD Insertion  
Guide<sup>9</sup>



7. Tie the purse string suture securely
8. Position cuff longitudinally the posterior rectus sheath above the transverse incision
9. Make a small stab wound in the anterior rectus sheath above transverse incision and pull catheter through the incision

<sup>1</sup> Argyle™\* IFU, 2018

<sup>9</sup> PD Insertion Guide, 2015

# OPEN INSERTION PROCEDURE CONTINUED

10. Use another purse string suture to make area watertight<sup>1</sup>
11. Close anterior rectus sheath with an uninterrupted nonabsorbable suture<sup>1</sup>
12. **Create subcutaneous tunnel using peritoneal tunneling stylet, or Faller tunneling trocar (refer to 'Creating a Subcutaneous Tunnel' section <sup>\*\*</sup>)<sup>1,2,9</sup>**

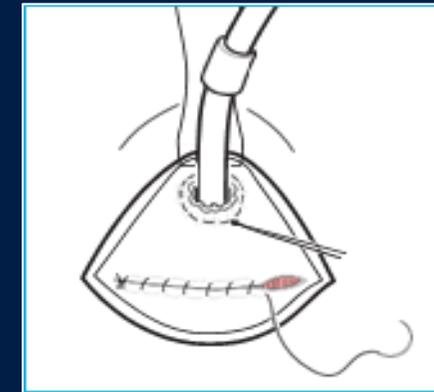


Figure 11. Retrieved from PD Insertion Guide<sup>9</sup>

**\*\*Slide # 23-31: 'Creating a Subcutaneous Tunnel'**

<sup>1</sup> Argyle™ \* IFU, 2018

<sup>2</sup> Haggerty, et al. 2014

<sup>9</sup> PD Insertion Guide, 2015

# OPEN INSERTION PROCEDURE<sup>1,2,9</sup>

## CONTINUED

13. Attach clamp and adapter

14. Attach a transfer set

15. Assess catheter function

- Infuse 1 to 2 liters of standard dialysate or minimally heparinized saline (1000 units/L)
- Check the wound for leaks and hemostasis
- At least 200 mL of solution should drain within 1 minute
- If good flow, close the subcutaneous tissue and the entry site with absorbable suture

16. Complete incision closure with sterile adhesive strips-**do not suture exit site.**

Figures 12 & 13.

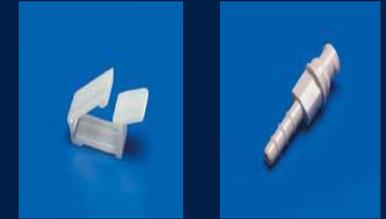


Figure 14. Retrieved from PD Insertion Guide<sup>9</sup>

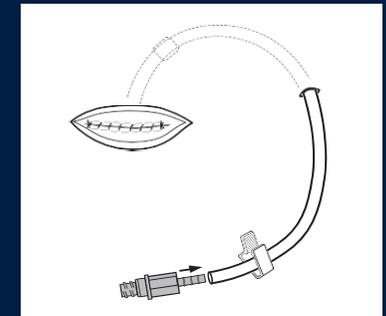
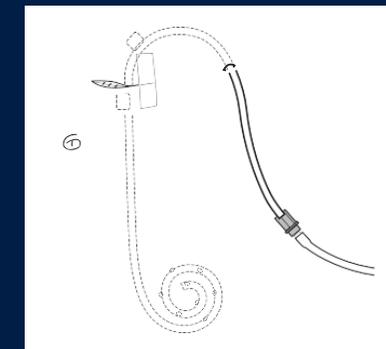


Figure 15. Retrieved from PD Insertion Guide<sup>9</sup>



<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggerty, et al. 2014

<sup>9</sup> PD Insertion Guide, 2015

# OPEN INSERTION PROCEDURE<sup>1,2,9</sup>

## CONTINUED

17. Secure catheter to the skin to minimize exit site movement
18. Place several layers of gauze dressings over the area and tape securely. The dressing should remain in place for one week unless there is bleeding or excessive drainage at the site
19. **Wait to perform dialysis for 1-3 days** if possible (2 weeks is optimal) to allow proper healing
20. If immediate dialysis required, the patient should be in a supine position with reduced volume exchanges of 500 mL

NOTE: For patients on intermittent dialysis, increase the initial volume gradually, providing it is tolerated well

Figure 16.  
Retrieved from  
PD Insertion  
Guide<sup>9</sup>

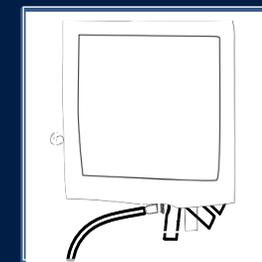


Figure 17.

<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggerty, et al. 2014

<sup>9</sup> PD Insertion Guide, 2015

# CREATING A SUBCUTANEOUS TUNNEL VIA TUNNELING STYLET OR FALLER TROCAR

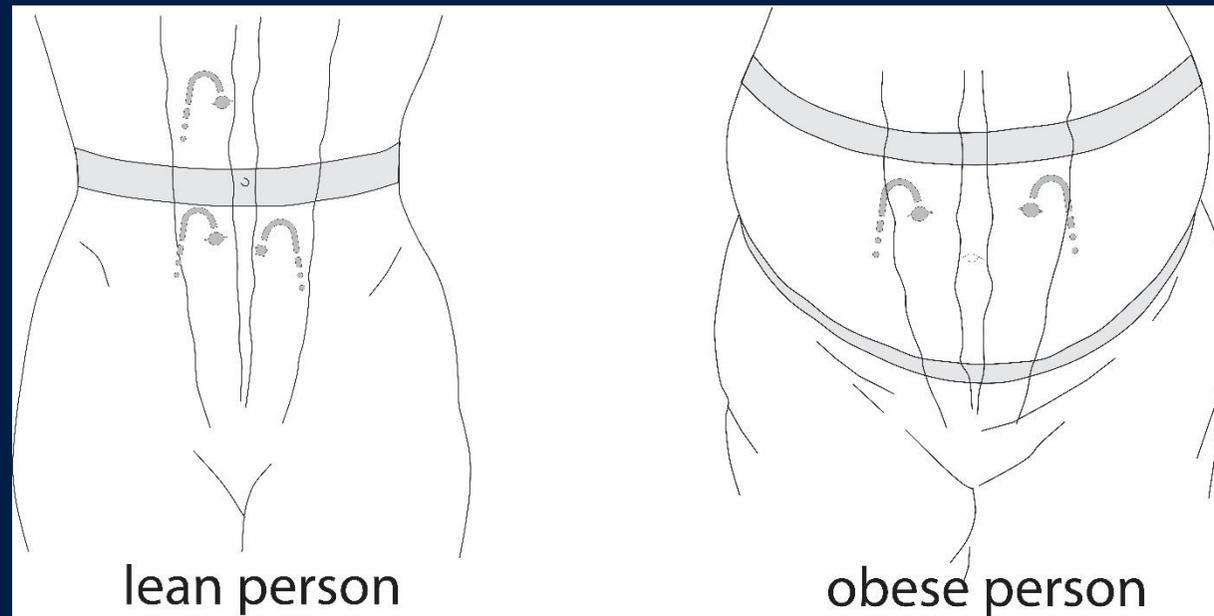


Figure 18. Illustrations from Argyle™\* Peritoneal Dialysis Catheter and Kits IFU, 2018<sup>1</sup>

<sup>1</sup>Argyle™\* IFU, 2018

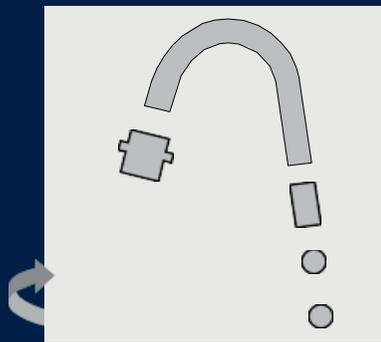
# CREATING A SUBCUTANEOUS TUNNEL

## WITH TUNNELING STYLET

Figure 19.



### Stencil



Stencil as shown is for use on left side of patient.

Turn over as indicated to use on right side.

Figure 1. Illustrations from Argyle™\* IFU<sup>1</sup>

### Algorithm

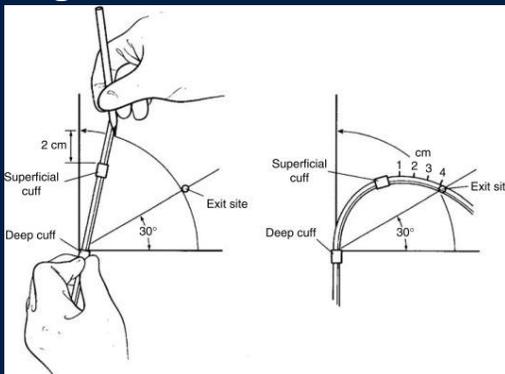


Figure 2. Reprint from Kidney International, 70, Crabtree J H. Selected best demonstrated practices in peritoneal dialysis access, 527-537, (2006), with permission from Elsevier.<sup>8</sup>

1. Anesthetize the skin where the exit site will be (~ 6cm to one side of the entry site)- then make a 5mm incision<sup>1</sup>
2. For **curved tunnel**, place tunneling stylet between the two incision sites and bend the stylet to desired shape of the tunnel (ensure cap is on the plastic end of the stylet before creating the curve)<sup>2</sup>
  - **NOTE:** stencil or algorithm outline can be followed<sup>7</sup>

<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggerty, et al. 2014

<sup>7</sup> Crabtree et al. 2005

# CREATING A SUBCUTANEOUS TUNNEL WITH TUNNELING STYLET

3. **Wet subcutaneous cuff thoroughly with saline, gently squeeze the cuff(s) to expel air** <sup>1,2</sup>
4. **Attach catheter to tunnelling stylet by pushing the catheter over the plastic end of the stylet until it meets the hub; slide cap over the connection-remove the catheter clamp** <sup>1,7</sup>

Figure 19.

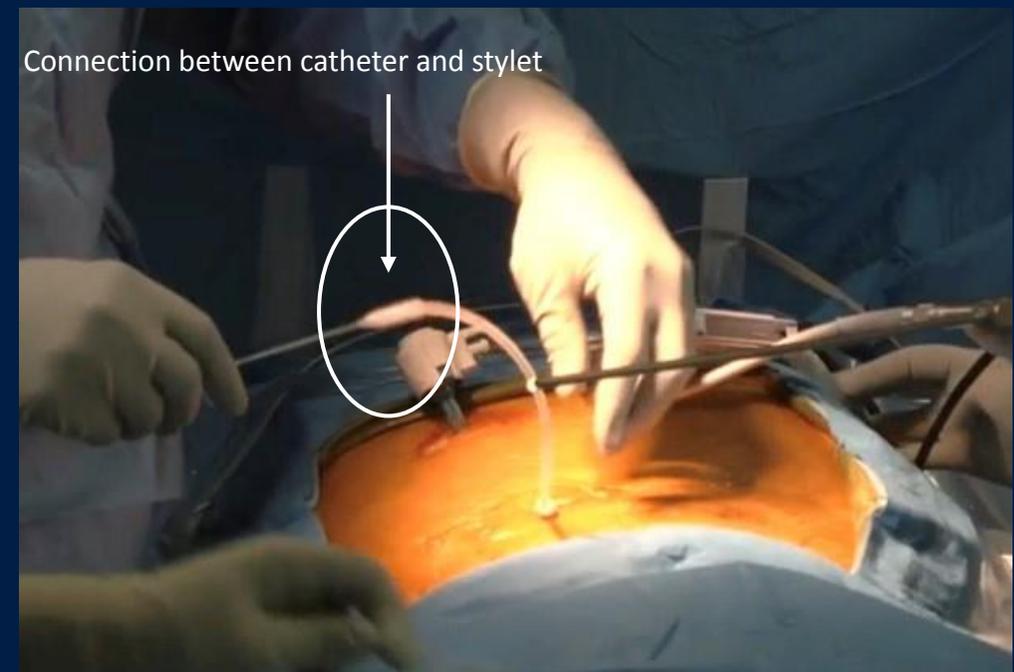


Figure 20. Image property of Medtronic

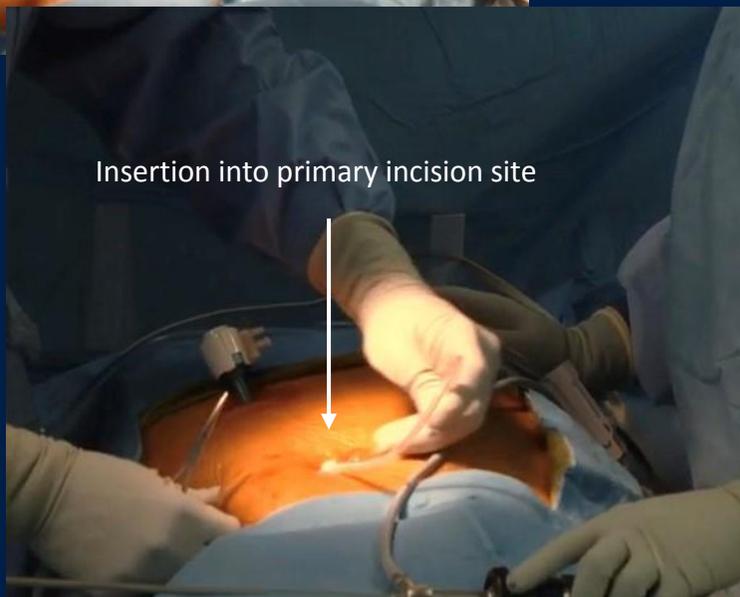
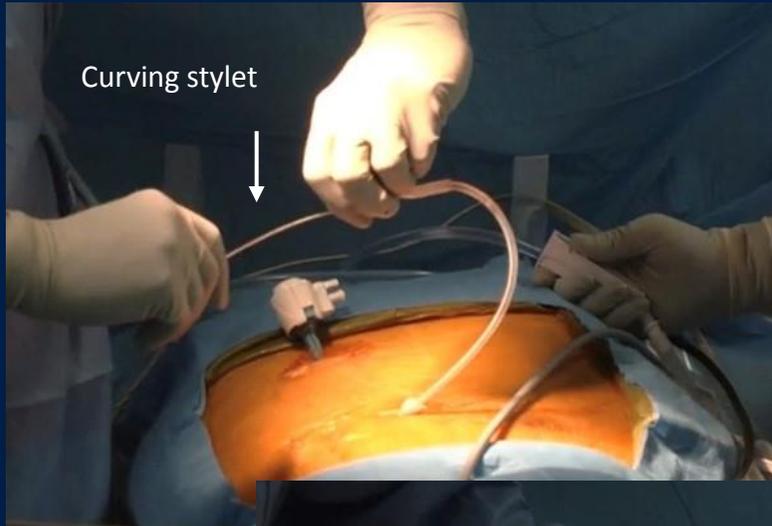
<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggerty, et al. 2014

<sup>7</sup> Crabtree et al. 2005

# CREATING A SUBCUTANEOUS TUNNEL

## WITH TUNNELING STYLET



Figures 21 and 22. Images property of Medtronic

Figure 19.



5. Insert the stylet tip into the primary incision; thread the stylet through the tissue, creating a ***curved subcutaneous tunnel*** to the exit site. The catheter **should exit at a downward angle to the skin**<sup>1</sup>
- **NOTE:** some physicians may prefer to make a straight tunnel. For efficient dialysis, slant a straight tunnel slightly upward to lessen the risk of catheter migration<sup>1</sup>

<sup>1</sup>Argyle™\* IFU, 2018

# CREATING A SUBCUTANEOUS TUNNEL<sup>1,2</sup>

## WITH TUNNELING STYLET

6. Spread the tunnel entrance with a haemostat to guide the cuff into the tunnel
7. Pull the stylet **through the exit site**, positioning the catheter as desired in the tunnel
8. Position the cuff subcutaneously 2-3 cm from the exit site to avoid cuff infection or extrusion; clamp catheter
9. Detach the tunneling stylet carefully and discard

**\*\*\*Next, follow steps for patency check and securement relevant to the insertion technique\*\*\***

<sup>1</sup> Argyle™\*IFU, 2018

<sup>2</sup> Haggarty et al. 2014

Figure 19.

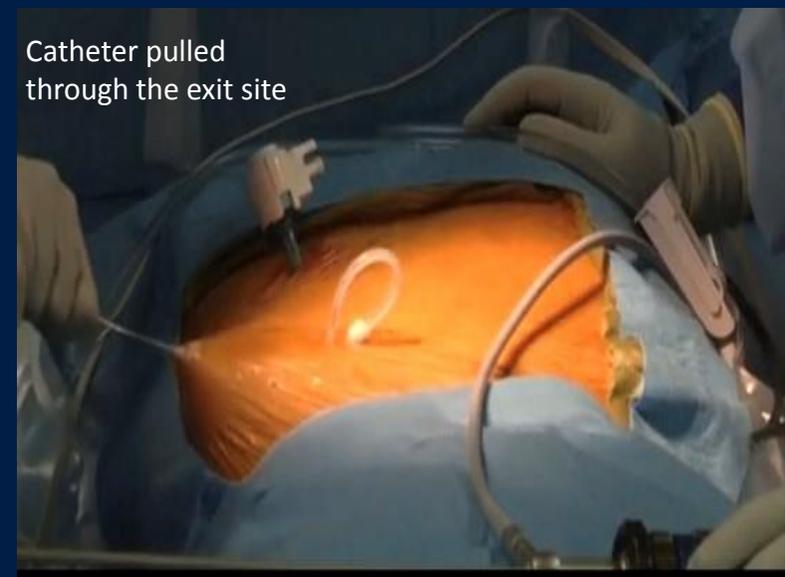


Figure 23. Image property of Medtronic

# CREATING A SUBCUTANEOUS TUNNEL<sup>1,2</sup>

## WITH FALLER TUNNELING TROCAR

1. Anesthetize the tunnel path, including highest point of the tunnel
2. Make a **1.5 cm transverse incision ~ 6cm** above the initial incision
  - Make a superior subcutaneous pocket to the level of the skin marking to accommodate the bent portion of the catheter and external cuff using blunt dissection with a haemostat/Kelly clamp

Figure 24.

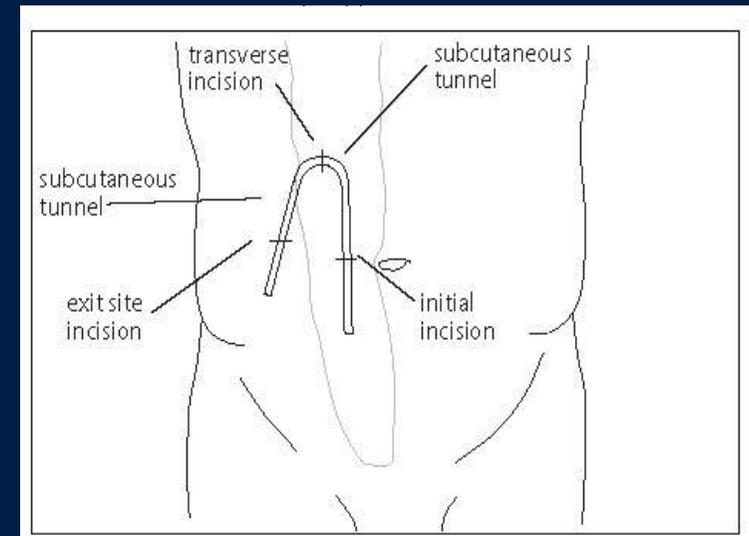


Figure 25. Illustration from the Argyle™\* IFU<sup>1</sup>

<sup>1</sup> Argyle™\* IFU, 2018

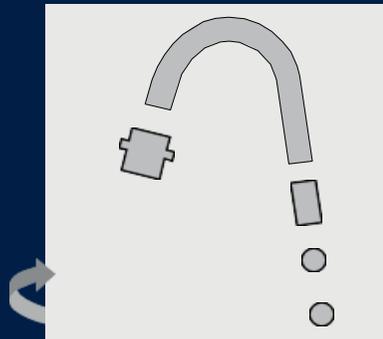
# CREATING A SUBCUTANEOUS TUNNEL<sup>1</sup>

## WITH FALLER TUNNELING TROCAR

Figure 24.



### Stencil



Stencil as shown is for use on left side of patient.

Turn over as indicated to use on right side.

Figure 1. Illustration from Argyle™ IFU<sup>1</sup>

### Algorithm

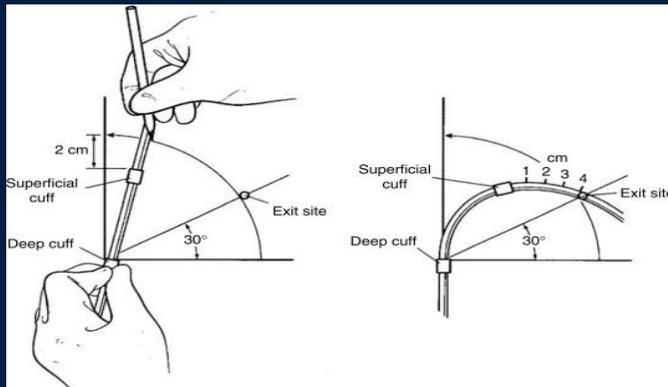


Figure 2. Reprint from Kidney International, 70, Crabtree J H. Selected best demonstrated practices in peritoneal dialysis access, 527-537, (2006), with permission from Elsevier.<sup>8</sup>

3. With the trocar included in the kit, make a tunnel in the subcutaneous tissue between the two incisions

**NOTE:** follow the stencil outline or algorithm if applicable

<sup>1</sup> Argyle™ IFU, 2018

# CREATING A SUBCUTANEOUS TUNNEL<sup>1</sup>

## WITH FALLER TUNNELING TROCAR

Figure 24.



4. Remove the trocar
5. **Wet the subcutaneous cuff thoroughly with saline and squeeze to expel air**
6. Grasp the catheter with the haemostat and pull it through the tunnel
7. Place the bent portion of the catheter in the pocket and allow the external tip to lie naturally on the surface of the skin. This **determines the direction of the subcutaneous tunnel**

<sup>1</sup> Argyle™\* IFU, 2018

# CREATING A SUBCUTANEOUS TUNNEL<sup>1</sup>

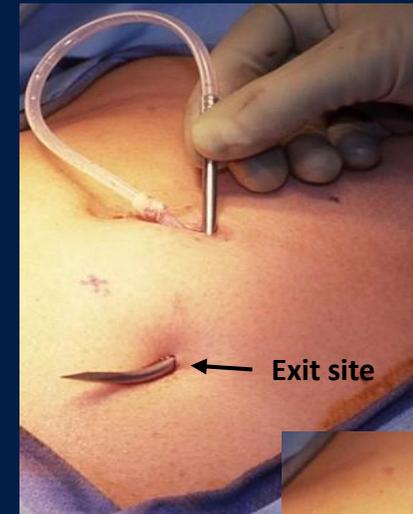
## WITH FALLER TUNNELING TROCAR

8. Make a **3-4 cm** incision below the cuff as catheter rests on the patient's abdomen
  - **CAUTION:** the portion of the tunnel between the subcutaneous cuff and the exit site incision should have a diameter no greater than that of the catheter
9. Bluntly probe a subcutaneous tunnel (if needed) from the upper incision down to the subcutaneous cuff using a haemostat or closed forceps
10. Attach the Faller tunneling trocar and tunnel down and out through the exit site
10. Detach the trocar carefully. Check patency and secure

**NOTE: \*\*\*Follow steps for patency check and securement relevant to the insertion technique\*\*\***

<sup>1</sup>Argyle™\* IFU, 2018

Figure 24.



Figures 26 and 27. Images used with permission from Dr. John Crabtree

# LAPAROSCOPIC INSERTION TECHNIQUE

# LAPAROSCOPIC INSERTION<sup>1,2</sup>

## ADVANTAGES AND DISADVANTAGES

Advantages	Disadvantages
Visualize abdominal cavity and insertion/placement of catheter tip into deep pelvis	Usually requires general anesthesia
Allows adjunct techniques, such as omentopexy and adhesiolysis to be included during insertion to avoid further catheter dysfunction	Requires experienced surgeon and specialized equipment
Could consider laparoscopic suture fixation of the PD catheter	
<p>Meta analysis showing<sup>10</sup></p> <ul style="list-style-type: none"> <li>▪ Lower proportion of migration in lap group compared to open insertion group (p=0.006)</li> <li>▪ One-year catheter survival rate higher in laparoscopic group compared to open insertion</li> </ul>	

<sup>1</sup> Argyle™\* IFU 2018

<sup>2</sup> Haggerty, et al. 2014

<sup>10</sup> Hagen, et al. 2013

# LAPAROSCOPIC INSERTION <sup>2,5</sup>

## BASIC VS ADVANCED LAPAROSCOPY

### Basic

- Laparoscopic visualization of appropriate catheter placement

### Advanced

- Goal is to address catheter migration, pericatheter leak and hernia, omental entrapment and flow obstruction

#### Potential adjunct procedures:

#### 1. Rectus sheath tunneling

- For longer embedding of the catheter in the muscle and thus better anchorage

#### 2. Omentopexy

- Performed to avoid entrapment of redundant omentum

#### 3. Selective Adhesiolysis

- Can be performed to address intra-peritoneal adhesions

#### 4. Colonopexy<sup>8</sup>

- Can be performed to manage redundant Sigmoid Colon

#### 5. Epiplectomy<sup>8</sup>

- Can be performed to manage remove epiploic appendices where needed

<sup>2</sup> Haggerty, et al. 2014

<sup>5</sup> Crabtree, 2010

<sup>8</sup> Crabtree, 2006

# LAPAROSCOPIC INSERTION PROCEDURE



Figure 28. Mini Step™ Trocar System



Figure 3.



Figure 29.

Argyle™\* Swan Neck Curl Cath peritoneal catheter available in both catheter only and kit configurations

1. Prepare equipment, sterile fields, patient, etc.
2. Those persons handling components should perform surgical scrub and don appropriate surgical attire<sup>1, 2</sup>

<sup>1</sup> Argyle™\* IFU 2018

<sup>2</sup> Haggerty, et al. 2014

# LAPAROSCOPIC INSERTION PROCEDURE

## CONTINUED



Figure 30. Image used with permission from Dr. John Crabtree

3. Anesthetize the skin and surrounding tissues of the tunnel with local anesthesia<sup>1,2,7</sup>
  - **NOTE:** if using **general anesthesia, the patient must be medically cleared and able to tolerate**<sup>1, 2</sup>
4. Determine exit site location (if not done preoperatively), as well as consider the initial port location which will be inserted under direct vision<sup>1,2,7</sup>

<sup>1</sup> Argyle™\* IFU 2018

<sup>2</sup> Haggerty, et al. 2014

<sup>7</sup> Crabtree et al. 2005

# LAPAROSCOPIC INSERTION PROCEDURE 1,2,5,8

## CONTINUED

5. Establish a pneumoperitoneum via **Veress needle, open technique** or **optical viewing trocar**, depending on the experience of the surgeon
  - Subcostal midclavicular line may be preferred **to avoid hernias**
  - Needle should be placed on **opposite** side of the intended insertion site

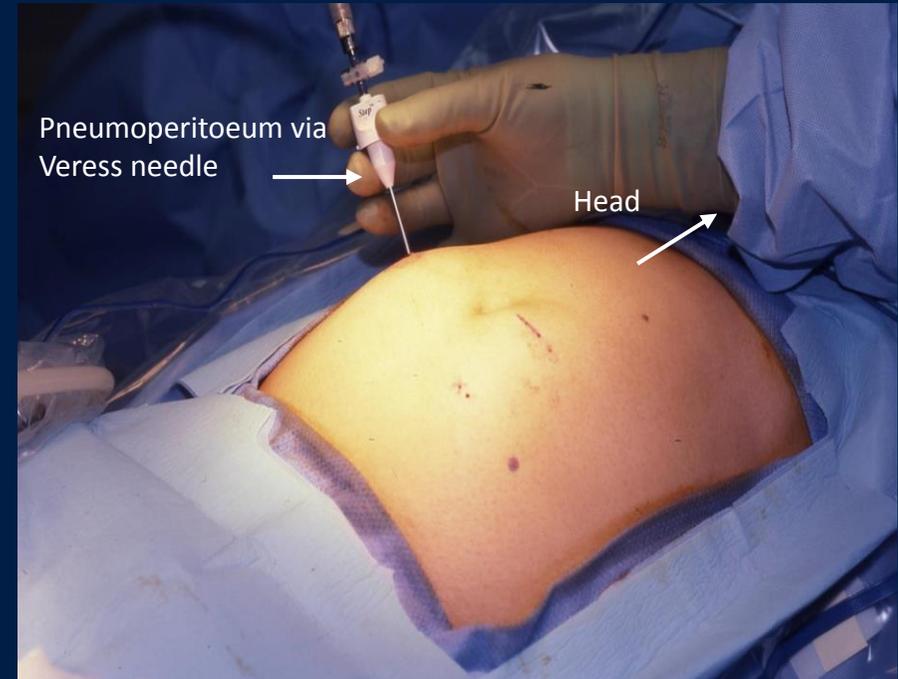


Figure 31. Image used with permission from Dr. John Crabtree

Veress needle and  
laparoscopic site  
options

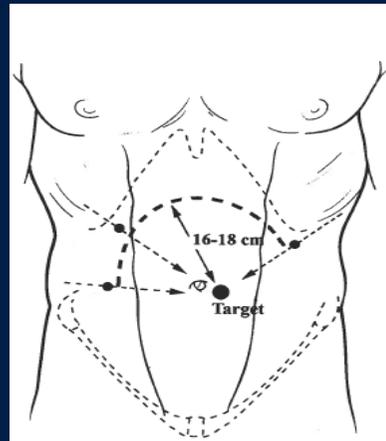


Figure. 32 Illustration used with permission from Dr. John Crabtree

<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggerty, et al. 2014

<sup>5</sup> Crabtree et al. 2005

<sup>8</sup> Crabtree, 2006

# LAPAROSCOPIC INSERTION PROCEDURE <sup>1,2,5,8</sup>

## CONTINUED

6. Use laparoscopic instruments per physician's preference. No standard number of ports suggested
  - average of two ports:
    - a. 1 port for the camera
    - b. 1 port for the optional grasping instruments
  - It is suggested to minimize the size & number of trocar ports to prevent leaks

### 2-PUNCTURE TECHNIQUE

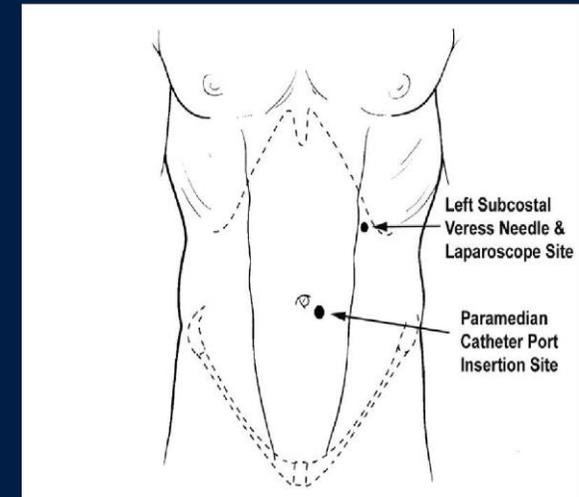


Figure 33. Illustration used with permission from Dr. John Crabtree

<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggerty, et al. 2014

<sup>5</sup> Crabtree et al. 2005

<sup>8</sup> Crabtree, 2006

# LAPAROSCOPIC PORT INSERTION<sup>1,2,7</sup>

## CONTINUED

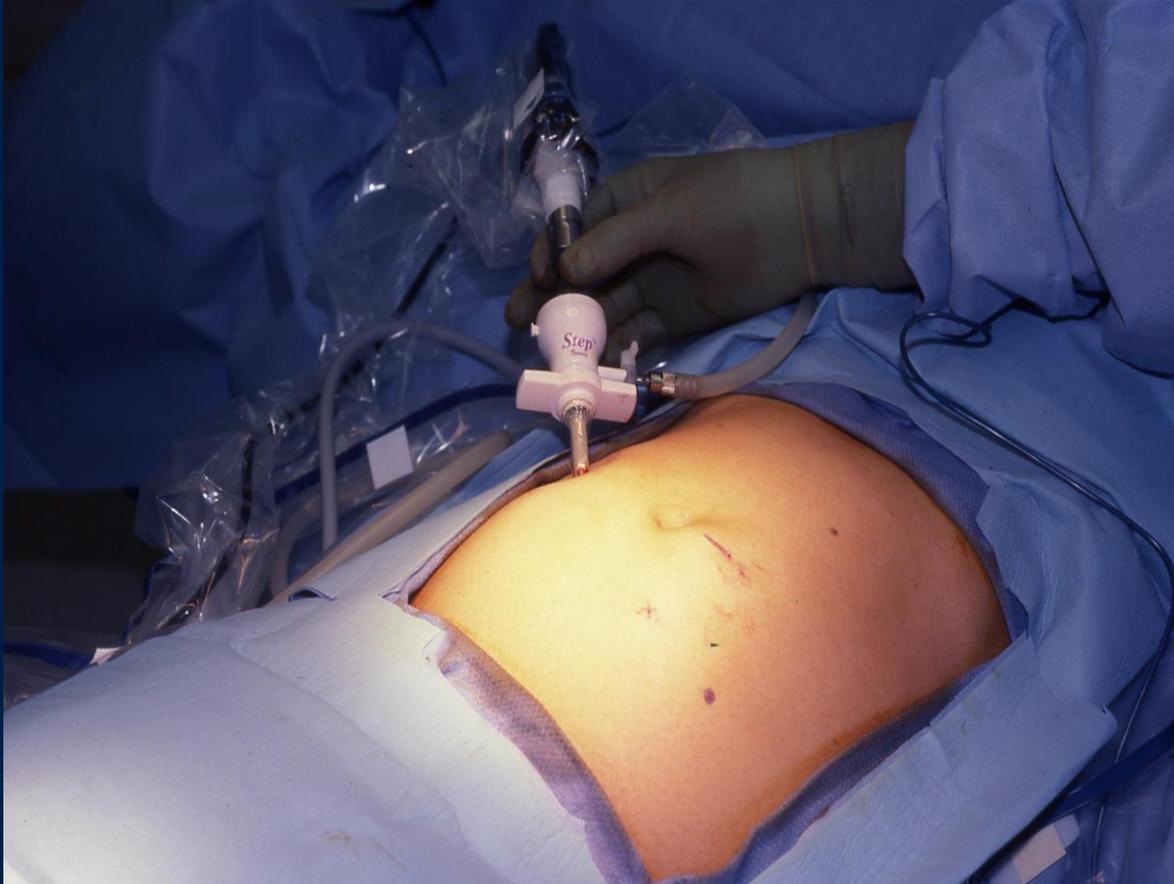


Figure 34. Image used with permission from Dr. John Crabtree

- Use a 5mm or smaller port to visualize peritoneum using a 0° or 30° scope
- Camera port should be far enough away from the catheter port to allow for adequate visualization of the implant procedure; **avoid periumbilical area**

<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggerty, et al. 2014

<sup>7</sup> Crabtree et al. 2005

# LAPAROSCOPIC INSERTION PROCEDURE <sup>1,2,5,8</sup>

## CONTINUED

6. **Explore abdomen** using the laparoscope with the patient in Trendelenburg position
  - Evaluate for:
    - Hernia
    - Redundant omentum
    - Adhesions
    - Redundant sigmoid colon
    - Epiploic appendences
  - **Perform adjunct procedures as needed** such as, hernia repair, omentopexy, adhesiolysis, or less commonly epiploectomy and/or colopexy
  - Note the epigastric vessels to avoid injury during catheter placement

<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggerty, et al. 2014

<sup>5</sup> Crabtree et al. 2005

<sup>8</sup> Crabtree, 2006

# LAPAROSCOPIC INSERTION PROCEDURE

## ADJUNCT PROCEDURE: HERNIA REPAIR

Figure 35.

Patent  
Processus  
Vaginalis  
(Male)



Figure 37.

Patent  
Processus  
Vaginalis  
(Female)

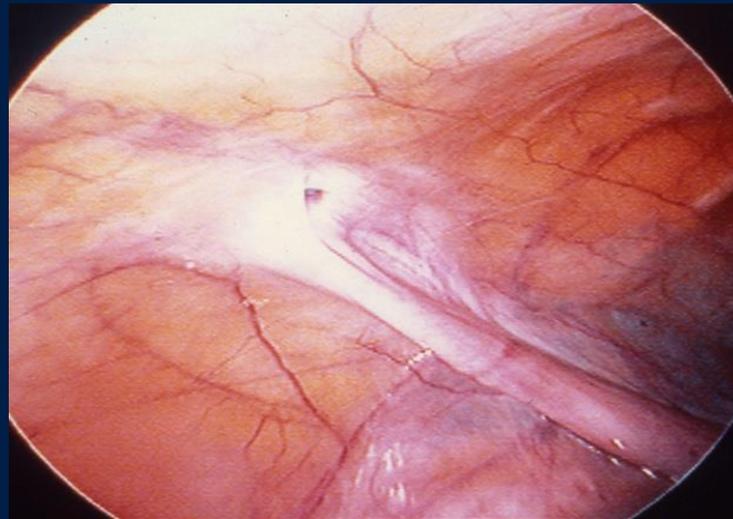


Figure 36.

Umbilical  
Hernia

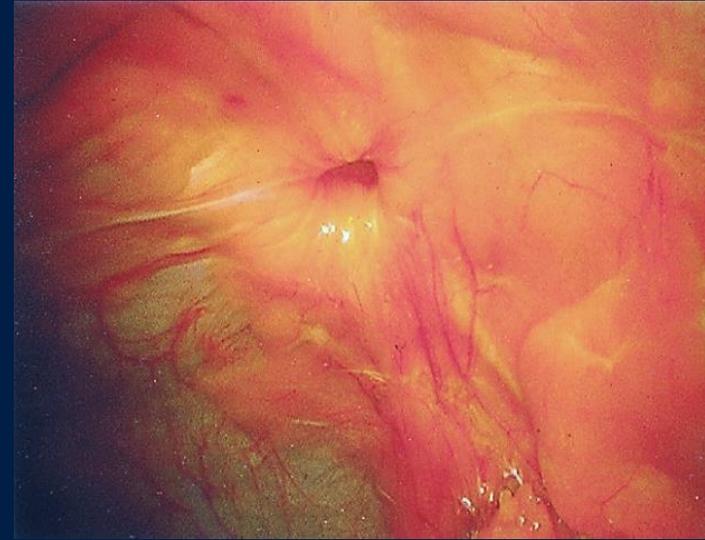
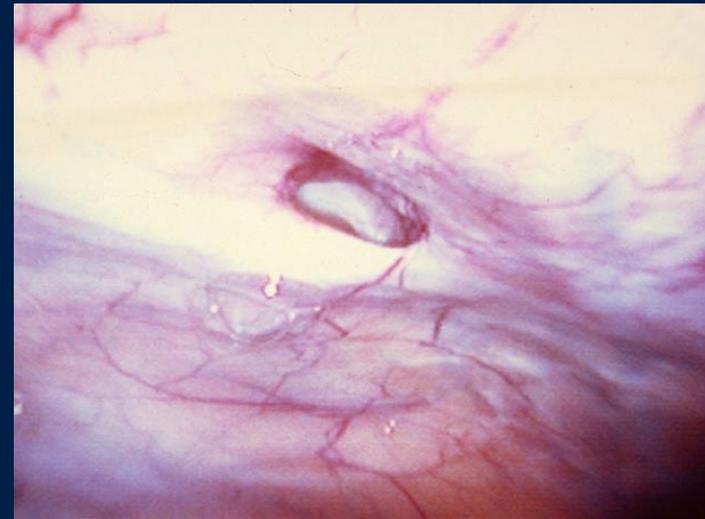


Figure 38.

Spigelian  
Hernia



Images used with permission from Dr. Crabtree MD

# LAPAROSCOPIC INSERTION PROCEDURE

## ADJUNCT PROCEDURE: REDUNDANT OMENTUM

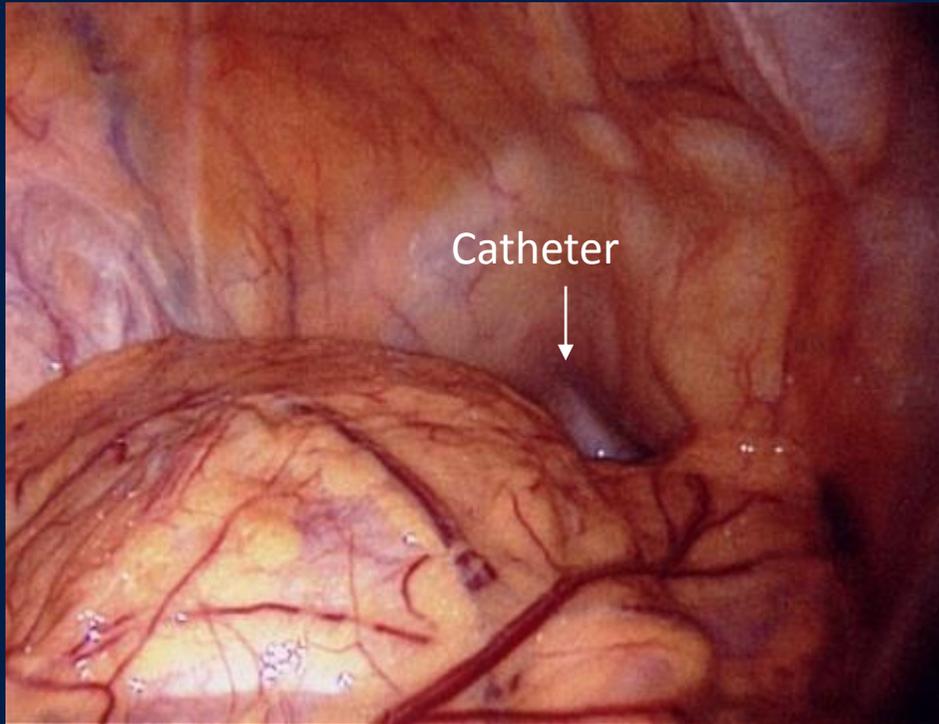


Figure 39. Image used with permission from Dr. John Crabtree

Redundant omentum  
wrapped around the  
catheter

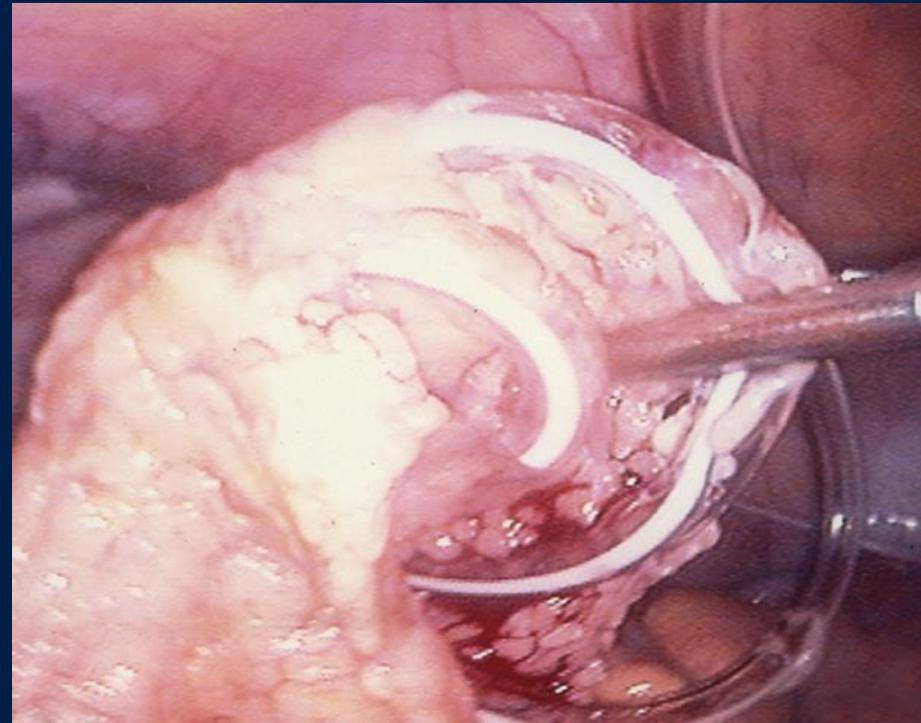


Figure 40. Image used with permission from Dr. John Crabtree

# LAPAROSCOPIC INSERTION PROCEDURE

## ADJUNCT PROCEDURE: OMENTOPEXY

An Omentopexy can be performed to prevent omentum from wrapping around the catheter

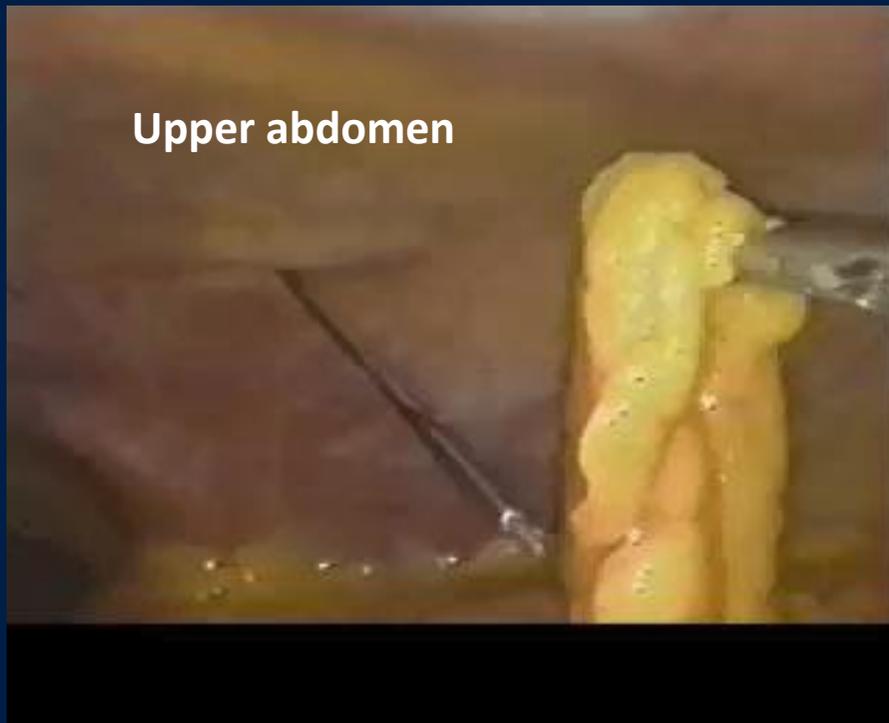


Figure 41. Image used with permission from Dr. John Crabtree

An Omentopexy involves the Omentum being fixed to the upper abdominal wall

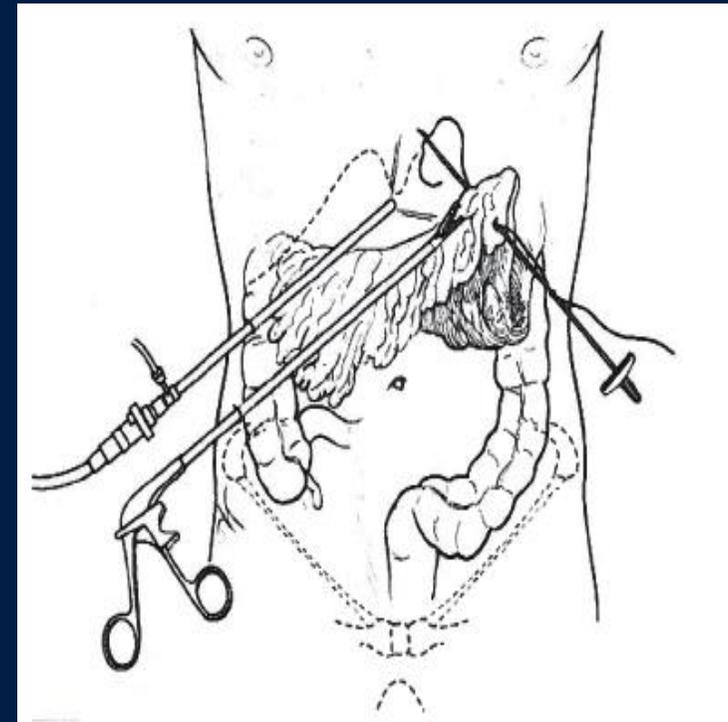


Figure 42. Crabtree et al. Selective performance of prophylactic omentopexy during laparoscopic implantation of peritoneal dialysis catheters. Surg Laparosc Endosc Percutan Tech 2003; 13:180-184. [https://journals.lww.com/surgical-laparoscopy/Abstract/2003/06000/Selective\\_Performance\\_of\\_Prophylactic\\_Omentopexy.8.aspx](https://journals.lww.com/surgical-laparoscopy/Abstract/2003/06000/Selective_Performance_of_Prophylactic_Omentopexy.8.aspx).

# LAPAROSCOPIC INSERTION PROCEDURE<sup>2</sup>

## ADJUNCT PROCEDURE: ADHESIONS

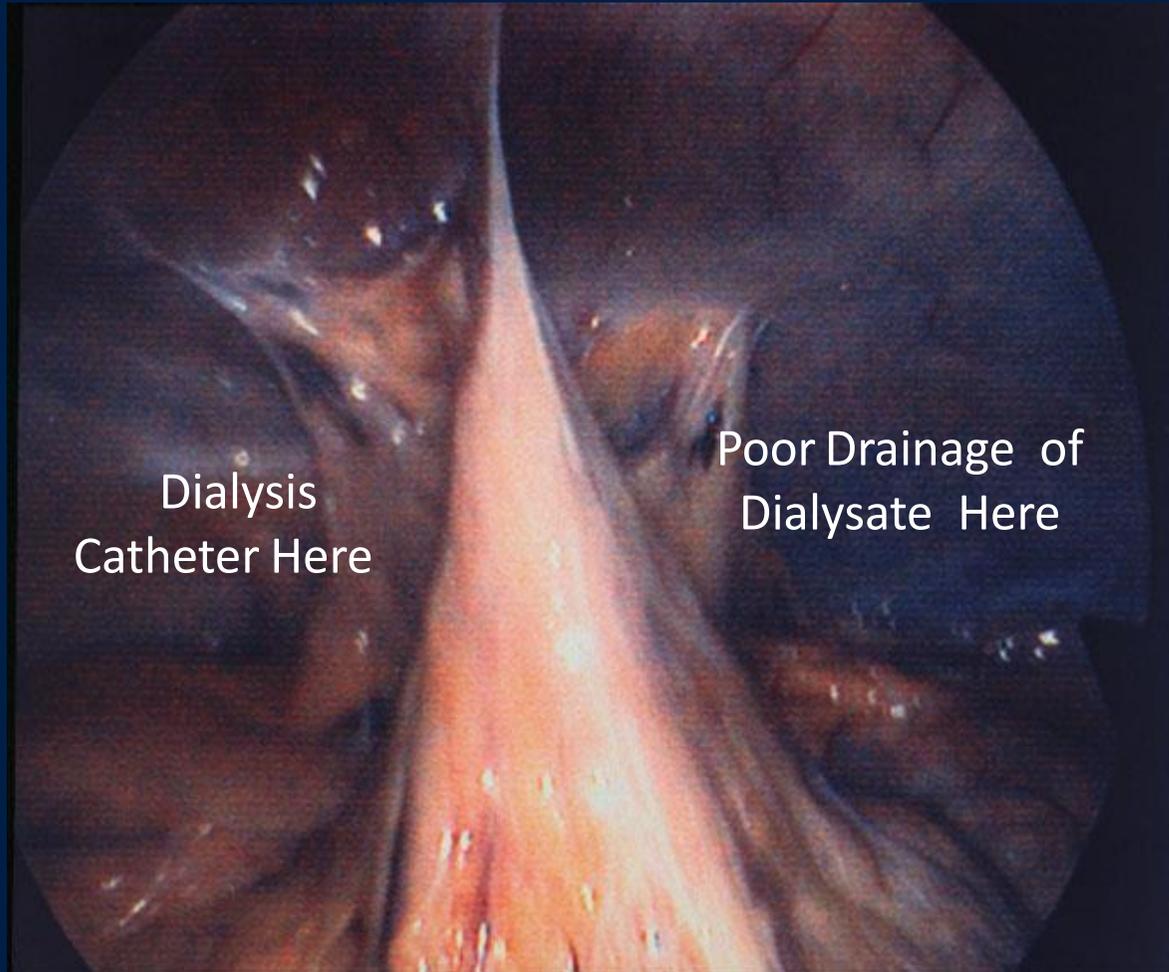


Figure 43. Image used with permission from Dr. John Crabtree

Adhesions can be gently removed from upper abdomen per physician discretion

The procedure of removing the adhesions is referred to as an adhesiolysis

<sup>2</sup> Haggerty, et al. 2014

# LAPAROSCOPIC INSERTION PROCEDURE

## ADJUNCT PROCEDURE: EPIPLOIC APPENDENCIES & EPIPLOECTOMY

Figure 44\*.

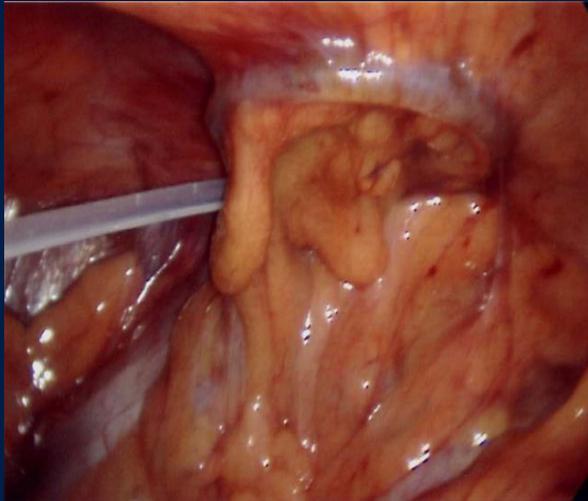
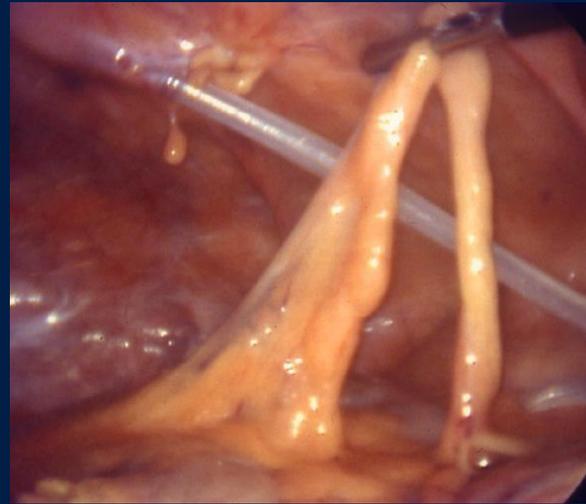


Figure 45\*.



Epiploic appendices are fat-filled tabs or pendants of peritoneum that project from the outer layer of the colon

Figure 46\*.



Removal of the epiploic appendices is an Epiploectomy<sup>2</sup>

\*Images used with permission from Dr. John Crabtree

<sup>2</sup> Haggerty, et al. 2014

# LAPAROSCOPIC INSERTION PROCEDURE

## ADJUNCT PROCEDURE: REDUNDANT SIGMOID AND COLOPEXY

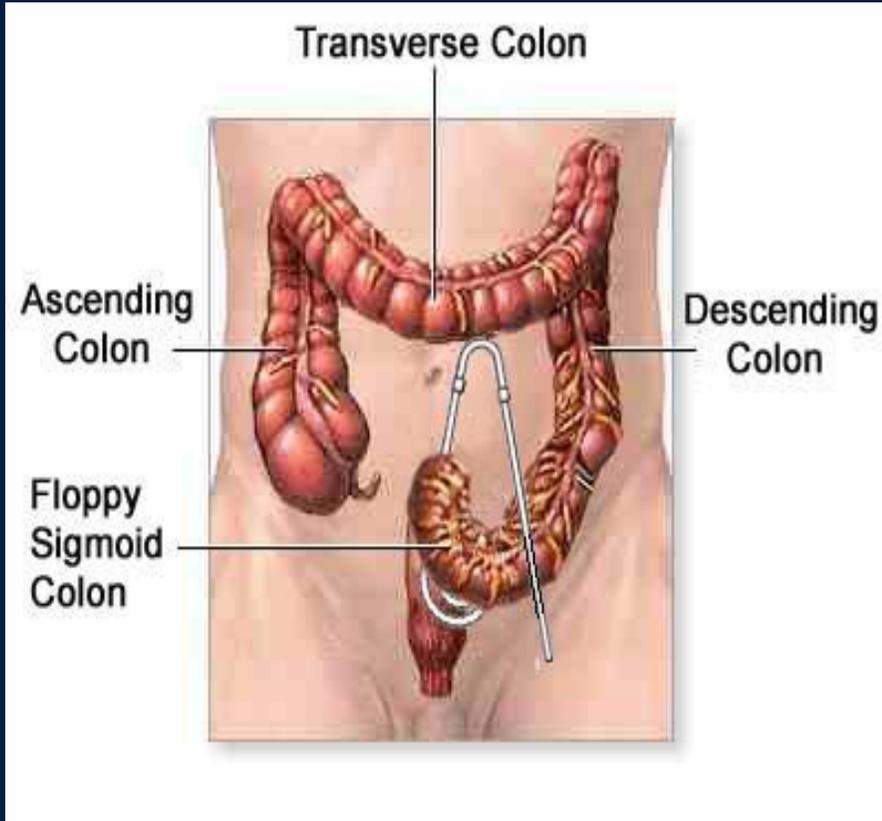


Figure 47. Illustrations used with permission from Dr. John Crabtree

Redundant sigmoid colon can fill the pelvic inlet and obstruct catheter flow

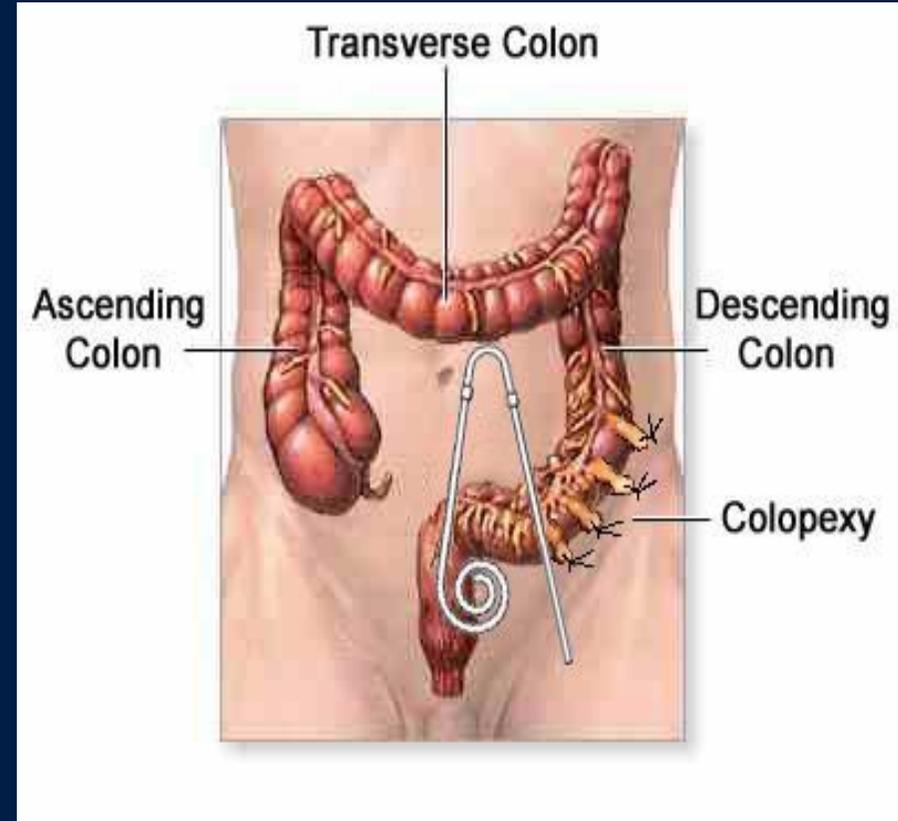


Figure 48. Illustrations used with permission from Dr. John Crabtree

Epiploicae of redundant colon sutured to lateral abdominal wall (Colopexy)

# LAPAROSCOPIC INSERTION PROCEDURE<sup>1,2,5,8</sup>

## CONTINUED

8. Choose insertion point in the paramedian rectus sheath
  - **\*\*Insert the catheter through the abdominal wall using one of several choices:**
    - a. **Use 10 mm trocar**, often with purse string and use a push in or pull out method of the catheter with grasping instrument
    - b. **Use 7/8mm Trocar System** allows the cuffed catheter to slide through and then the trocar removed
    - c. **Use a peel apart sheath and dilator**
    - d. **Quill™\* catheter guide and cuff implanter**



Figure 49. 10 mm Trocar



Figure 50. 7/8 mm Trocar

<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggerty, et al. 2014

<sup>5</sup> Crabtree et al. 2005

<sup>8</sup> Crabtree, 2006

# LAPAROSCOPIC INSERTION PROCEDURE

## CONTINUED

- During the implantation, the deep cuff placed between anterior and posterior rectus sheaths<sup>1</sup>
- Note: Fascial purse string suture placed around the catheter in **pediatric** patients to decrease the incidence of leak<sup>1</sup>

9. **Soak the catheter in sterile saline and squeeze cuffs to expel air immediately prior to insertion<sup>1,2,5</sup>**

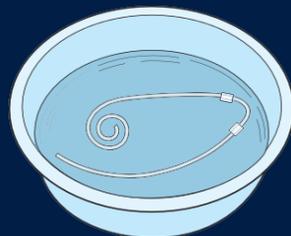


Figure 6

10. Make a small 1-2 cm incision at this point<sup>1</sup>

<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggerty, et al. 2014

<sup>5</sup> Crabtree et al. 2005

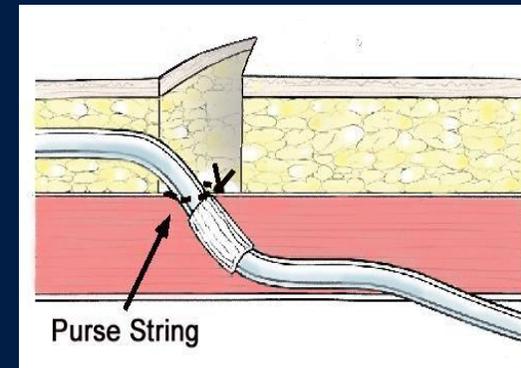


Figure 51. Image used with permission from Dr. John Crabtree



Figure 52. Image used with permission from Dr. John Crabtree

# LAPAROSCOPIC INSERTION PROCEDURE

## CREATE RECTUS SHEATH TUNNEL WITH A TROCAR<sup>1,2,5</sup>

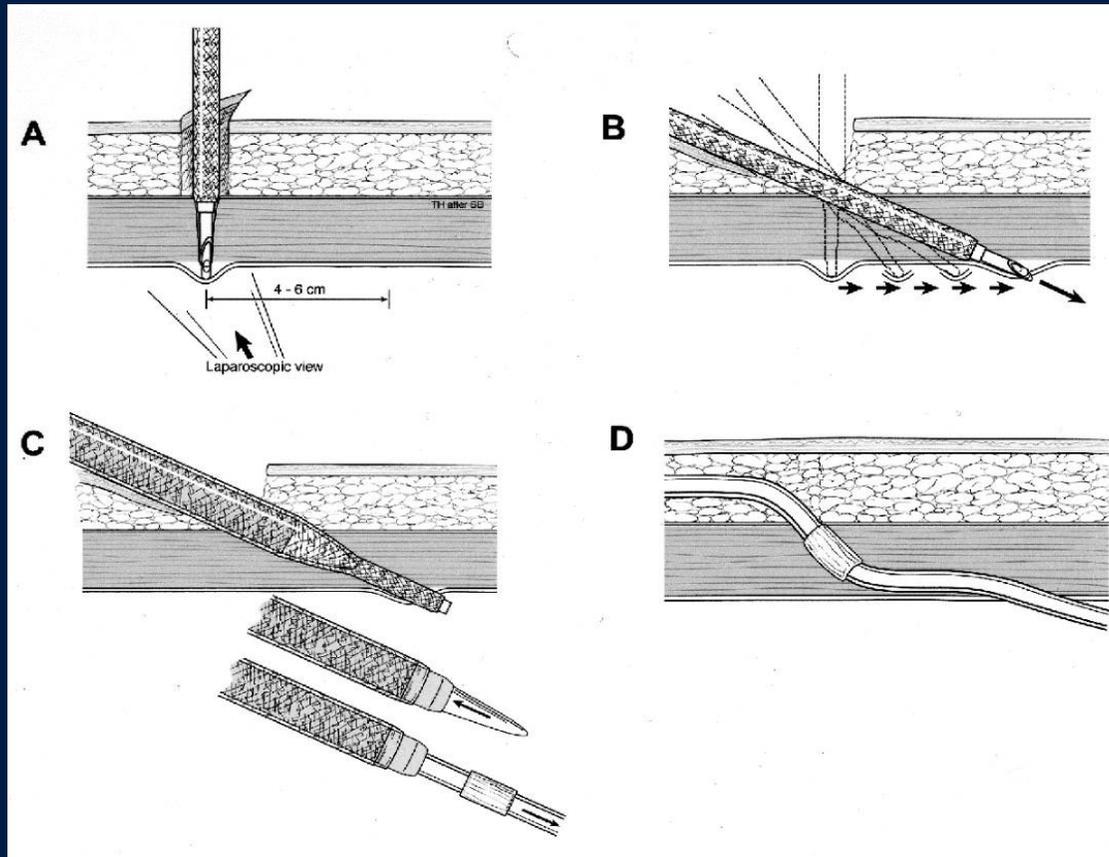


Figure 53. Reprint from Kidney International, 70, Crabtree J H. Selected best demonstrated practices in peritoneal dialysis access, 527-537, (2006), with permission from Elsevier.<sup>8</sup>

- Advance Trocar or pull apart sheath through the anterior and posterior rectus sheaths, but **NOT** through the peritoneum (see Figure 53- A,B)
- **Under direct vision**, tunnel the trocar or pull-apart sheath in the preperitoneal space, 5 cm down to the midline of the abdomen...then pierce the peritoneum (see Figure 53-C,D)

Note: A longer tunnel of 4-6 cm has been suggested to reduce tip migration<sup>5</sup>

<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggerty, et al. 2014

<sup>5</sup> Crabtree et al. 2005

<sup>6</sup> Crabtree . 2006

# LAPAROSCOPIC INSERTION PROCEDURE<sup>1,2,5,8</sup>

## CONTINUED

12. Use a straightening stylet to introduce the catheter into the peritoneal cavity through the trocar *or* pull-apart sheath
  - The tip of the catheter should be positioned between the anterior and posterior rectus sheaths

### 13. Remove straightening stylet

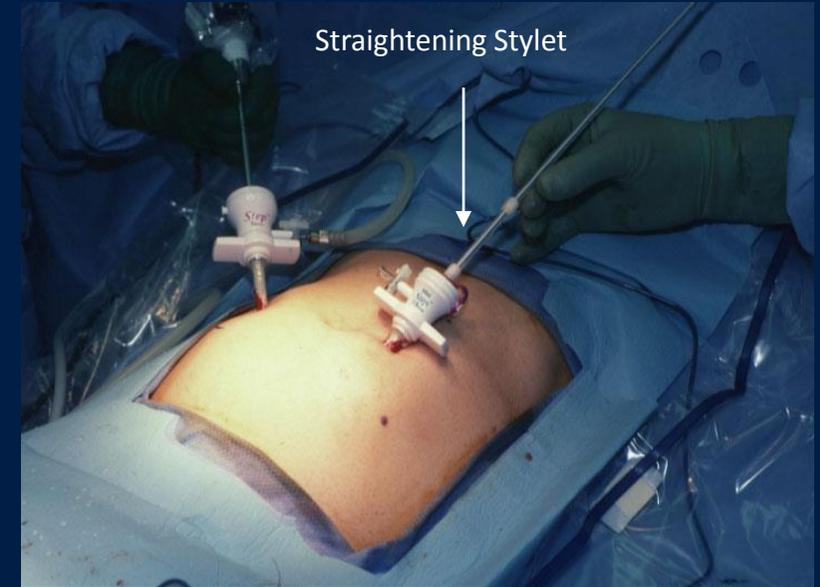


Figure 54. Image used with permission from Dr. John Crabtree



Figure 55. Image used with permission from Dr. John Crabtree

<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggerty, et al., 2014

<sup>5</sup> Crabtree et al., 2005

<sup>8</sup> Crabtree, 2006

# LAPAROSCOPIC INSERTION PROCEDURE

## EXAMPLE OF RECTUS SHEATH TUNNEL WITH A PULL-APART SHEATH

Pull-apart sheath partially expanded



Figure 56. Image property of Medtronic

Secure catheter in place before fully removing sheath

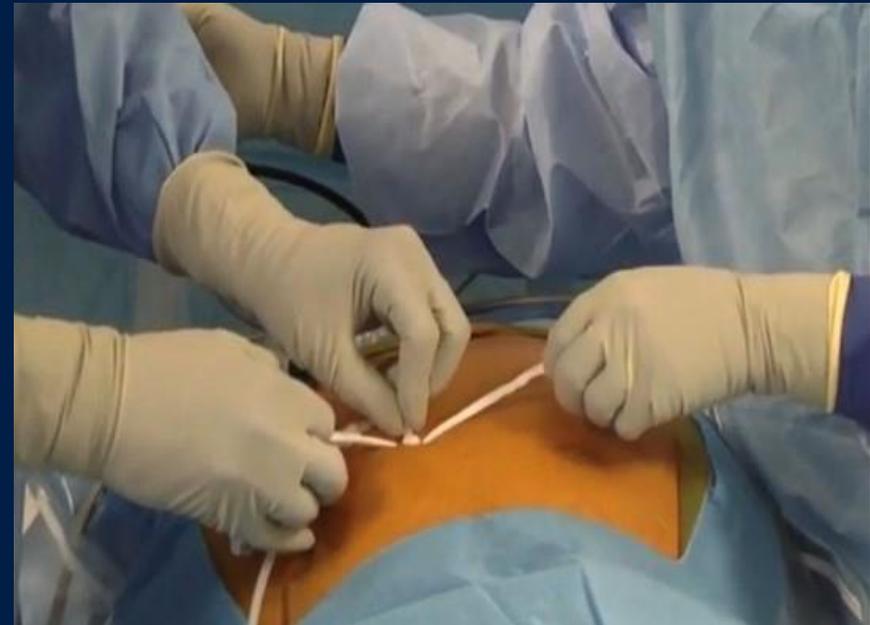
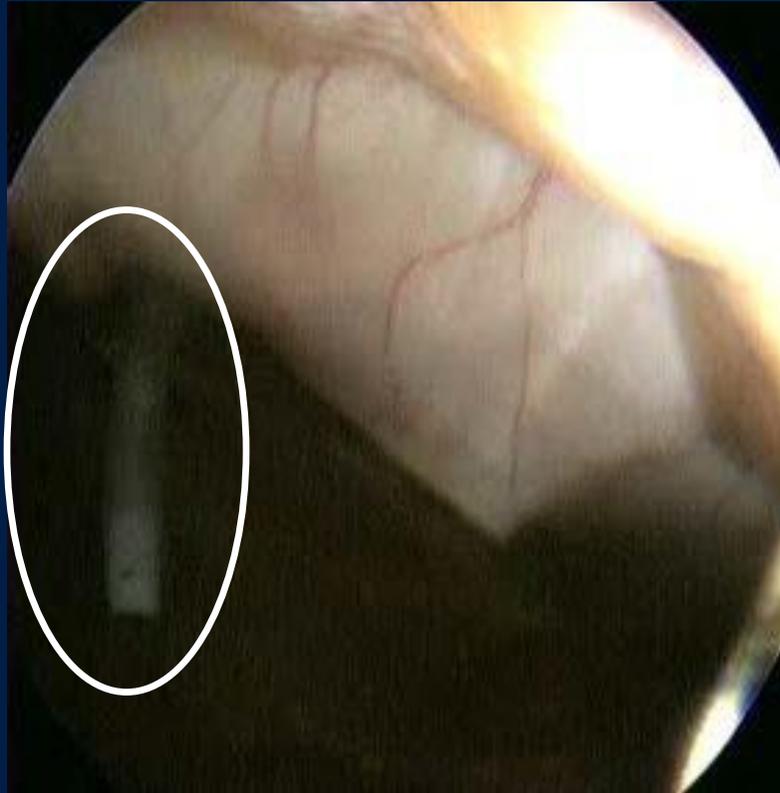


Figure 57. Image property of Medtronic

# LAPAROSCOPIC INSERTION

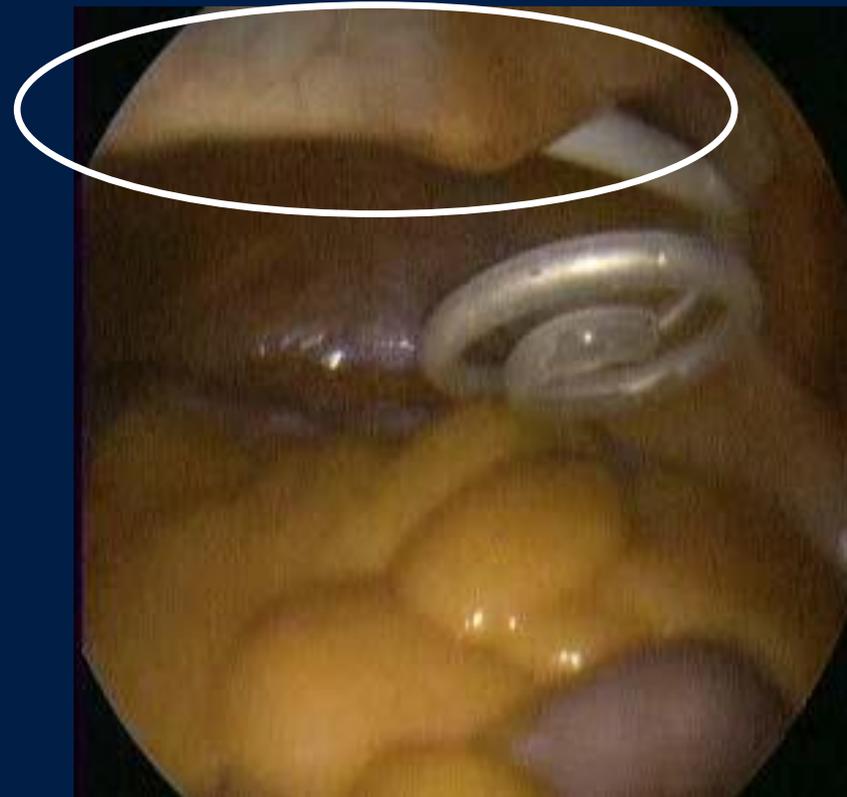
## EXAMPLE RECTUS SHEATH TUNNEL

Figure 58.



Visualizing the insertion device (sheath, blunt trocar, or grasper) as it comes through the rectus muscle

Figure 59.

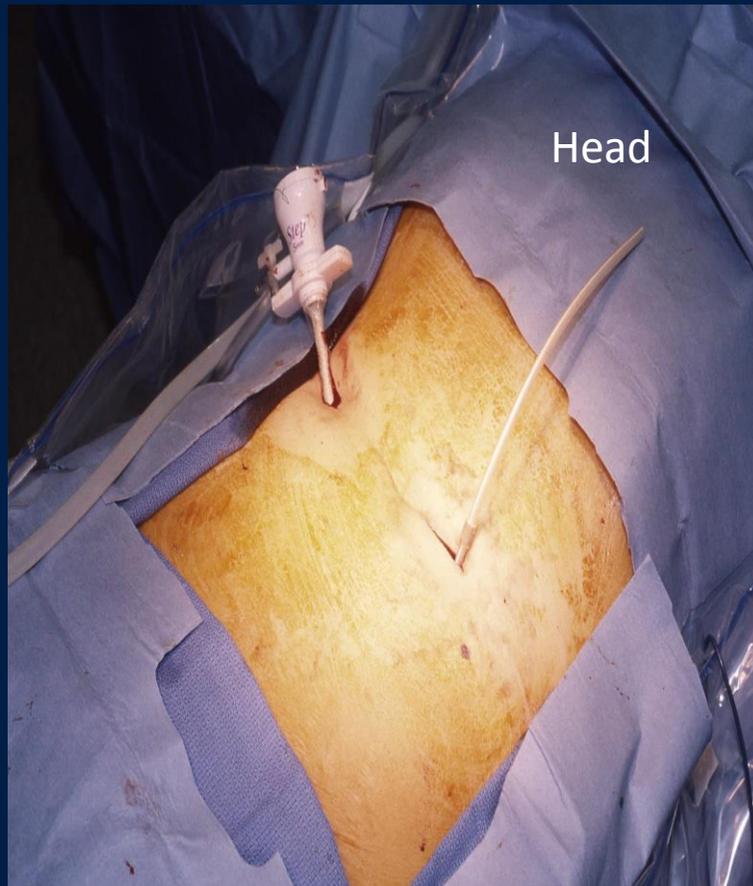


Tunneled 4-6cm toward the midline pelvis before penetrating and entering the peritoneal cavity

Images courtesy of Dr. Stephen Haggerty

# LAPAROSCOPIC INSERTION PROCEDURE<sup>1,2,5,8</sup>

## CONTINUED



Figures 60. Image used with permission from Dr. John Crabtree

14. Grasp the pull-apart sheath or port while holding the catheter in place during removal.
  - When removing the pull-apart sheath pull the tabs outwards, simultaneously to peel the sheath from the catheter
  - Ensure the deep cuff is positioned properly between anterior and posterior rectus sheath for optimal ingrowth. Refer to slide # 52 for visualization
15. Create a subcutaneous tunnel using either a peritoneal tunneling stylet, or Faller tunneling trocar (refer to 'Creating a Subcutaneous Tunnel' for options<sup>\*\*</sup>)
16. Post implantation, check in and outflow intraoperatively

**\*\*Slide #23-31: 'Creating a Subcutaneous Tunnel'**

<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggerty, et al., 2014

<sup>5</sup> Crabtree et al., 2005

<sup>8</sup> Crabtree, 2006

# LAPAROSCOPIC INSERTION PROCEDURE

## CONTINUED

After creating the subcutaneous tunnel...

17. Attach the adapter and clamp; ensure no kinks or twists in the catheter<sup>1,2,5,8</sup>
18. Attach a transfer set and assess catheter function<sup>1</sup>
  - Infuse 500-1000 mL of standard dialysate or minimally heparinized saline (1000u/L). Check wound for leaks and hemostasis
  - At least 200 mL of solution should drain within 1 minute.
    - If good flow obtained, close the subcutaneous tissue and entry site with absorptive suture- **do not** suture the exit site

<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggerty, et al., 2014

<sup>5</sup> Crabtree et al., 2005

<sup>8</sup> Crabtree, 2006

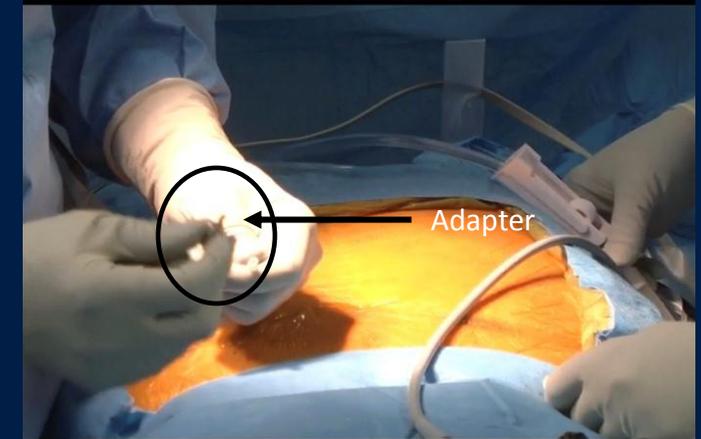


Figure 61. Image property of Medtronic

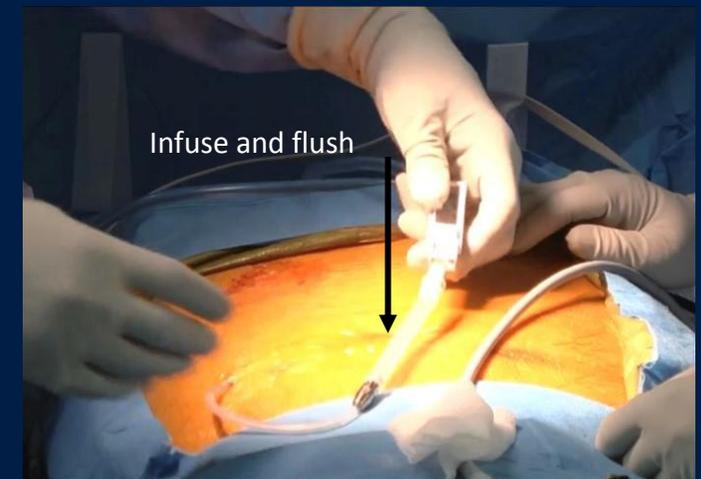


Figure 62. Image property of Medtronic

# LAPAROSCOPIC INSERTION PROCEDURE<sup>1,2, 5</sup>

## CONTINUED

Figure 63.  
Image  
property of  
Medtronic



Figure 64.  
Image  
property of  
Medtronic

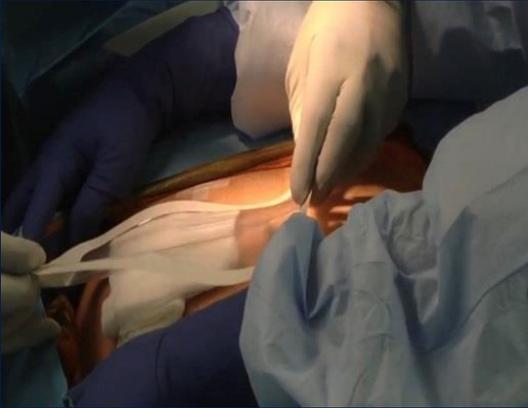


Figure 17.



19. Complete incision closure with sterile adhesive strips
20. Secure the catheter to minimize movement at the exit site
  - Place several layers of gauze dressing over the area and tape securely
  - Dressings remain for 1 week unless bleeding or excessive drainage present at site
21. **Optimal period to start dialysis is 2 weeks** post insertion. However urgent starts may be required:
  - Place patient supine with reduced volume exchanges of 500-1000 mL.
  - For patients that continue on to IPD, increase the initial volume gradually as tolerated

<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggerty, et al., 2014

<sup>5</sup> Crabtree et al., 2005

# PERCUTANEOUS PERITONEOSCOPIC INSERTION TECHNIQUE

# PERCUTANEOUS PERITONEOSCOPIC INSERTION<sup>2</sup>

## ADVANTAGES AND DISADVANTAGES

Advantages	Disadvantages
Can be performed at bedside or outpatient setting	Requires specialized equipment and expertise
Does not require the use of a surgeon, OR suite, or anesthesia	Does not allow adjunctive procedures such as adhesiolysis or omentopexy
Provides visualization of the peritoneum	Risk of vascular and bowel injury on insertion <sup>4</sup>

<sup>2</sup>Haggerty, et al. 2014

# PERCUTANEOUS PERITONEOSCOPIC INSERTION PROCEDURE <sup>1</sup>

1. Prepare equipment, sterile fields, patient, etc.

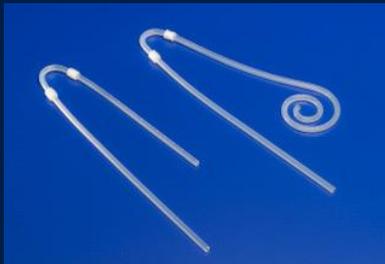


Figure 3

2. Make a 1.5-2.0 cm incision at selected abdominal entry site
3. Use blunt dissection to form a pocket for the preperitoneal cuff (if applicable)

4. Attach the introducer needle to a 10 mL syringe filled with heparinized saline
  - Insert needle through incision into the peritoneal cavity; inject saline carefully
  - Aspiration of peritoneal fluid indicates the needle tip is in the peritoneal cavity

**CAUTION: do not advance the needle further; could injure the viscera**

5. Immediately remove syringe
  - insert the flexible end of the guidewire through the introducer needle, directing it caudad and posteriorly
  - Advance wire approximately  $\frac{1}{4}$  of its length (~18 cm)
6. Withdraw the introducer needle, leaving the guidewire in the peritoneum

<sup>1</sup> Argyle™\* IFU, 2018

# PERCUTANEOUS PERITONEOSCOPIC INSERTION PROCEDURE

## CONTINUED

7. Check that the dilator is locked within the introducer sheath to prevent separation of the two components during insertion<sup>1</sup>

To lock the dilator, rotate the dilator so the flange on its hub locks under the clip on the sheath

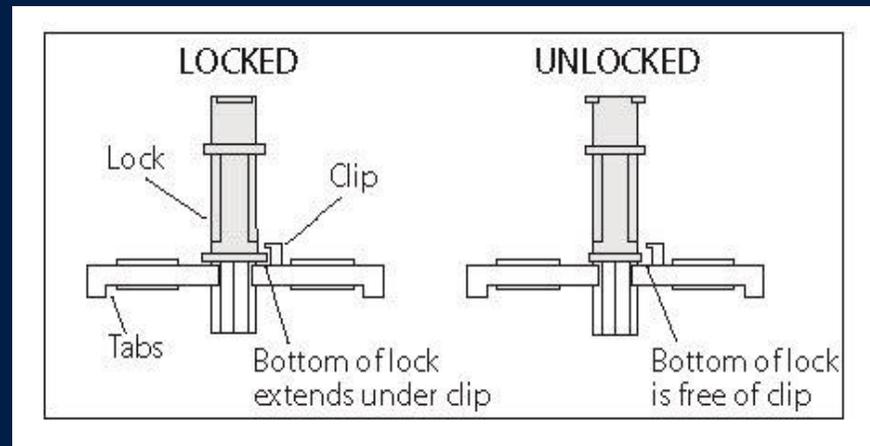


Figure 65.  
Illustrations  
from Argyle™\*  
IFU<sup>1</sup>

8. Thread the pull-apart introducer over the end of the guidewire<sup>1, 2</sup>  
**CAUTION: do not let sheath advance over dilator or it may damage the tissue. The two must be grasped as one unit.**
  - Advance the introducer into the peritoneum, trying **not to force introducer or insert further than necessary** for the patient's size and access site
  - Ensure that the guidewire does not move further into the peritoneum

<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggarty et al. 2014

# PERCUTANEOUS PERITONEOSCOPIC INSERTION PROCEDURE<sup>1</sup>

## CONTINUED

9. Hold the sheath in place and remove the guidewire
  - Unlock the dilator from the sheath by rotating the dilator so the flange is free of the clip on the sheath
10. If using the straightening stylet, lubricate the catheter with sterile saline and insert the stylet into catheter

**NOTE:** if not using a straightening stylet, lubricate the catheter with sterile water soluble lubricant

- **Roll the cuffs between the thumb and index finger to expel air**
- Position the stylet **~4 mm** above the tip of the catheter
- Clamp a haemostat on the stylet (**do not clamp catheter**) to prevent it from advancing further toward the tip

**CAUTION: do not insert the stylet beyond the tip of the catheter as this can cause injury**

11. Insert the catheter with catheter stylet into the sheath, directing it toward the desired position

<sup>1</sup> Argyle™\* IFU, 2018

# PERCUTANEOUS PERITONEOSCOPIC INSERTION PROCEDURE

## CONTINUED

12. Insert the catheter stylet into the sheath, directing it toward the desired position

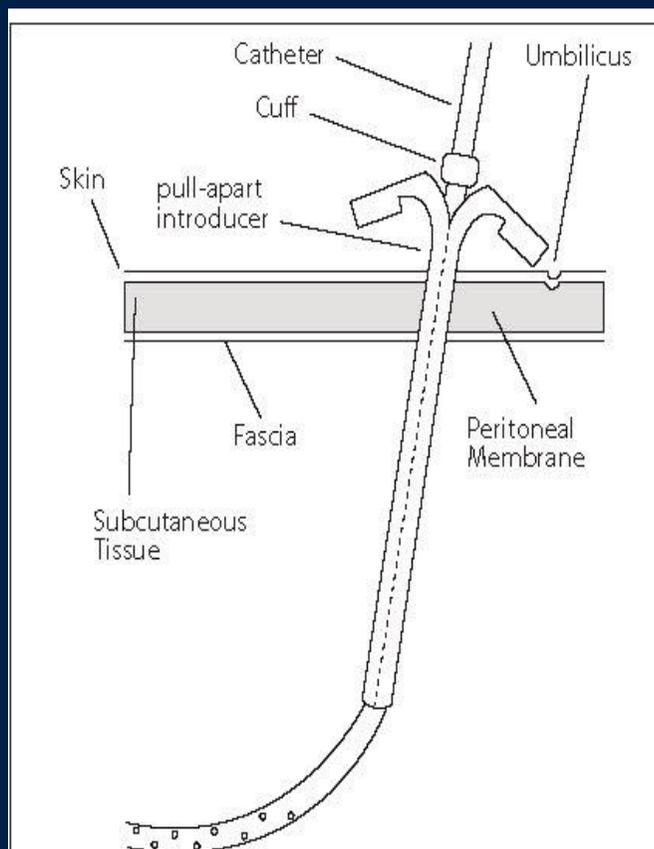


Figure 66.  
Illustration from  
Argyle™\* IFU.  
2018<sup>1</sup>

13. Remove the catheter straightening stylet; confirm drainage
14. Grasp the tabs of the sheath and, while holding the catheter in place, pull the tabs outwards simultaneously to peel the sheath from the catheter
15. **Create a subcutaneous tunnel<sup>2</sup>** (see ‘Creating a Subcutaneous Tunnel’<sup>\*\*</sup>)
17. Attach the adapter and clamp; ensure no kinks or twists in the catheter



Figures 12 & 13.

**\*\*Slide #23-31:** ‘Creating a Subcutaneous Tunnel’

<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggarty et al. 2014

# PERCUTANEOUS PERITONEOSCOPIC INSERTION PROCEDURE

## CONTINUED

18. Attach a transfer set and assess catheter function<sup>1</sup>
  - Infuse 500-1000 mL of standard dialysate or minimally heparinized saline (1000u/L). Check wound for leaks and hemostasis
  - **At least 200 mL of solution should drain within 1 minute.**
    - If good flow obtained, close the subcutaneous tissue and the entry site with absorptive suture- **do not suture the exit site**
    - Complete incision closure with sterile adhesive strips
  
19. Secure the catheter to minimize movement at the exit site<sup>1</sup>
  - Place several layer of gauze dressing over the area and tape securely
  - Dressings remain for 1 week unless bleeding or excessive drainage present at site
  
20. **Optimal period to start dialysis is 2 weeks** post insertion; however urgent starts may be necessary.<sup>1,2</sup>
  - In this situation, place patient supine with reduced volume exchanges of 500-1000 mL. For patients that continue on to IPD, increase the initial volume gradually as tolerated



2 weeks

<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggerty, et al., 2014

# FLUOROSCOPIC GUIDED PERCUTANEOUS INSERTION TECHNIQUE

# FLUOROSCOPIC GUIDED PERCUTANEOUS INSERTION<sup>2,11</sup>

## ADVANTAGES AND DISADVANTAGES

Advantages	Disadvantages
Performed in radiology not in the OR	Inability to perform other surgical interventions
Least invasive	No direct visualization of abdomen in high risk patients or those with prior significant abdominal surgery <sup>7</sup>
Minimal sedation	
Ultrasound guidance for needle placement reduces risk of bowel perforation <sup>12</sup>	

<sup>2</sup> Haggerty, et al., 2014

<sup>11</sup> BC Renal Agency, 2013

<sup>12</sup> Abdel-Aal, et al., 2011

# FLUOROSCOPIC GUIDED PERCUTANEOUS INSERTION<sup>12</sup>

- Nonionic contrast injection used to confirm location of catheter in peritoneal cavity
- If no ascites, many use normal saline to displace bowel loops and create space for catheter placement
- Can be challenging in patients with prior abdominal surgery and intraperitoneal adhesions
- Abdel-Aal, Gaddikeri & Saddekni (2001) reported experience with 95 placements using this technique:
  - 97.9% technical success rate
  - Complications included 2 bowel perforations (2.1%)

<sup>12</sup> Abdel-Aal, et al., 2011

# FLUOROSCOPIC GUIDED PERCUTANEOUS INSERTION PROCEDURE <sup>12,13</sup>

1. Prepare equipment, sterile fields, patient, etc.
2. Procedure usually performed under conscious sedation per physician choice
3. Use ultrasound to identify overlying vessels and underlying bowel-colour ultrasound may be helpful<sup>12, 13</sup>



Figure 67. Image used with permission from Dr. Micah Chan

The inferior epigastric artery is the most important vessel to be aware of during insertion <sup>12,13</sup>

<sup>12</sup> Abdel-Aal, et al., 2011

<sup>13</sup> Arabi et al., 2017

# FLUOROSCOPIC GUIDED PERCUTANEOUS INSERTION PROCEDURE <sup>12,13</sup>

## CONTINUED

4. Anesthetize the selected site
5. Advance a 21-G micropuncture needle **under ultrasound guidance** through the body of the rectus abdominis muscle - avoid the lateral margin of the rectus
  - Direct needle 45° - 60° caudally toward the pelvis
  - Do not advanced needle more than 3-5 mm beyond the peritoneal reflection (hyperechoic line) to avoid localized contrast accumulation within the omentum<sup>12</sup>
6. Once the fascia is pierced, inject contrast to confirm intraperitoneal position
  - Localized contrast accumulation could be related to subcutaneous/intramuscular injection or within the omentum

<sup>12</sup> Abdel-Aal, et al., 2011

<sup>13</sup> Arabi et al., 2017

# FLUOROSCOPIC GUIDED PERCUTANEOUS INSERTION PROCEDURE <sup>12,13</sup>

## CONTINUED

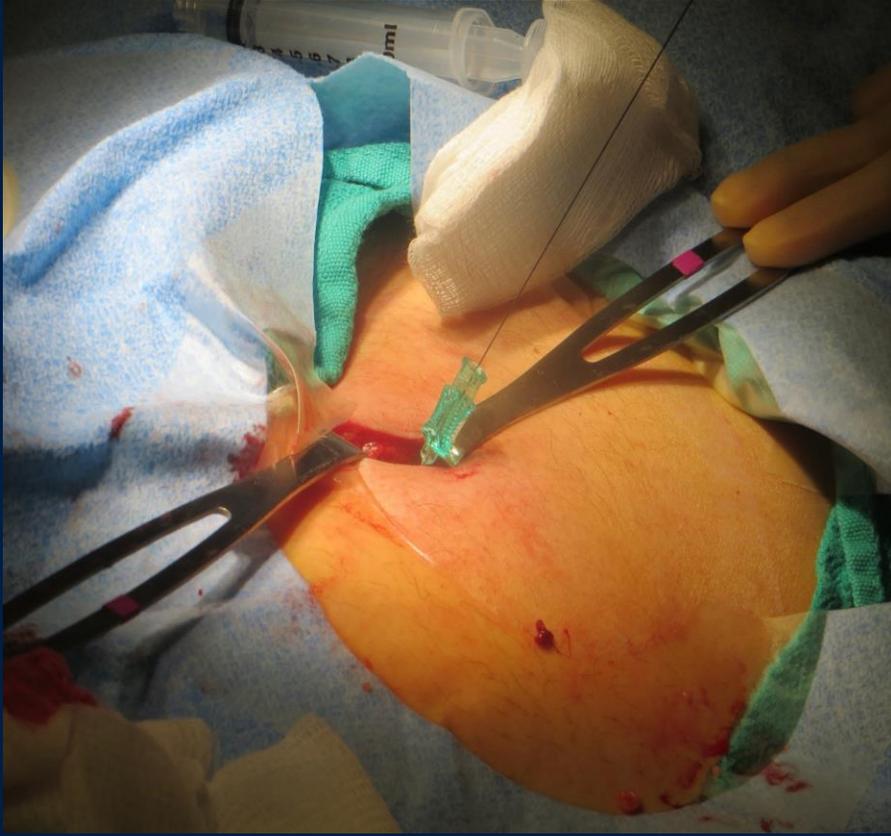


Figure 68. Image used with permission from Dr. Micah Chan

7. Infuse 300–500 mL of normal saline into the pelvis to expand the pelvic cavity and allow for easy navigation of wire into the deep pelvis and proper positioning of the catheter's loop
8. Insert a stiff hydrophilic-tipped wire in lateral projection into the posterior deep pelvic cavity
9. Make a 1–2 cm transverse skin around the wire, and bluntly dissect the subcutaneous tissue
10. Introduce a peel-away sheath over the wire toward the pelvis

<sup>12</sup> Abdel-Aal, et al., 2011

<sup>13</sup> Arabi et al., 2017

# FLUOROSCOPIC GUIDED PERCUTANEOUS INSERTION PROCEDURE<sup>12,13</sup>

## CONTINUED

12. Soak catheter and flush with saline; squeeze cuffs to eliminate trapped air
13. Insert the catheter over the wire
14. Suture the deep cuff with absorbable sutures
15. Peel away sheath and suture deep cuff to the deep subcutaneous tissue/rectus sheath fascia
  - This prevents catheter migration and minimizes the risk of pericatheter leak
16. Inject contrast to check positioning and before subcutaneous tunneling
17. Create a retrograde C-shaped lateral subcutaneous tunnel to secure the superficial cuff 2–4 cm from the skin exit site (see ‘Creating a Subcutaneous Tunnel’<sup>\*\*</sup>)

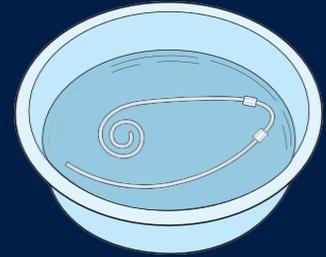


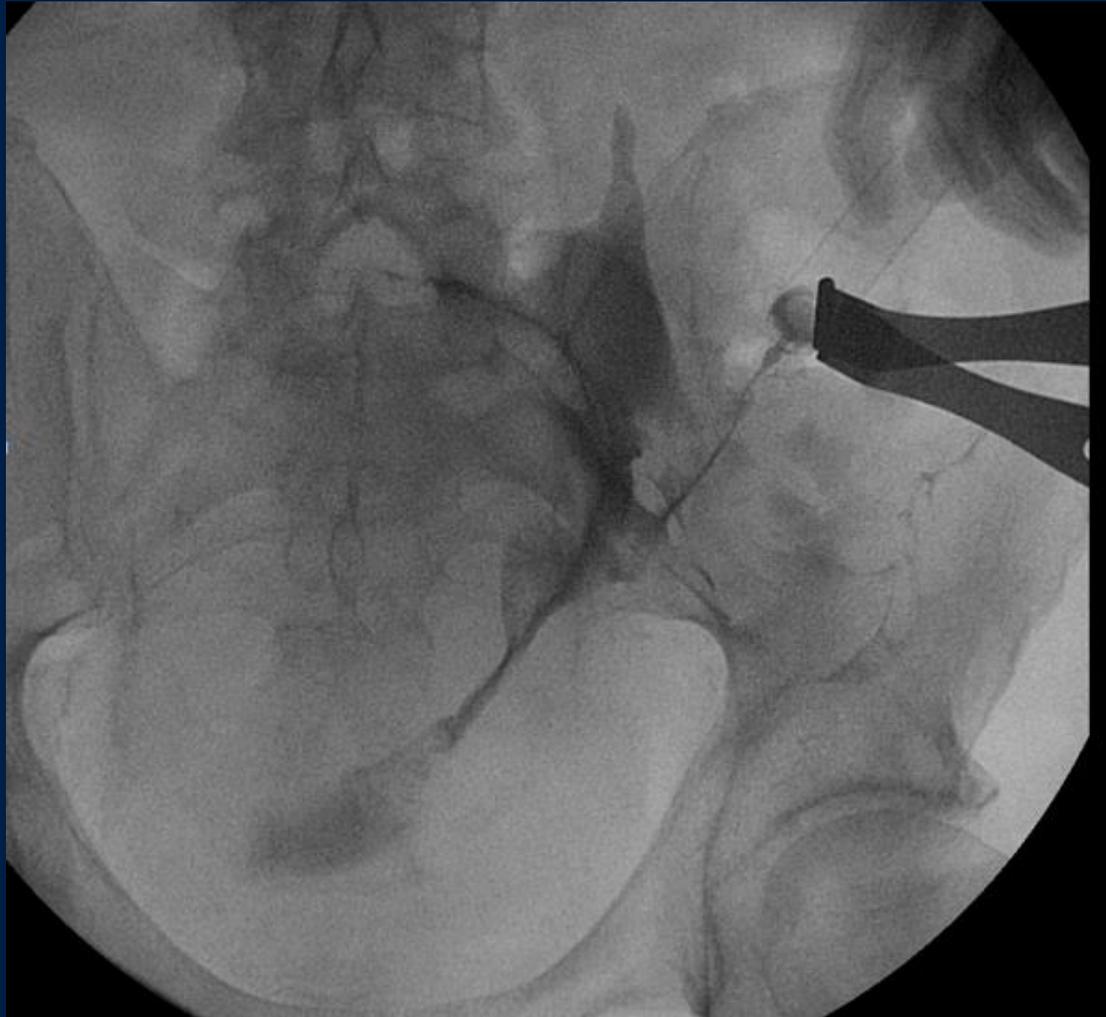
Figure 6.

<sup>12</sup> Abdel-Aal, et al., 2011

<sup>13</sup> Arabi et al., 2017

**\*\*Slide #23-31: Creating a Subcutaneous Tunnel**

# USE OF CONTRAST TO CHECK FOR FREE FLOW AND OUTLINE BOWEL WALL



Check for free in  
and out flow

Contrast should  
flow freely into  
the pelvis with  
outlining of the  
bowel wall

Figure 69. Image used with permission from Dr. Micah Chan

# CORRECT PLACEMENT OF CATHETER

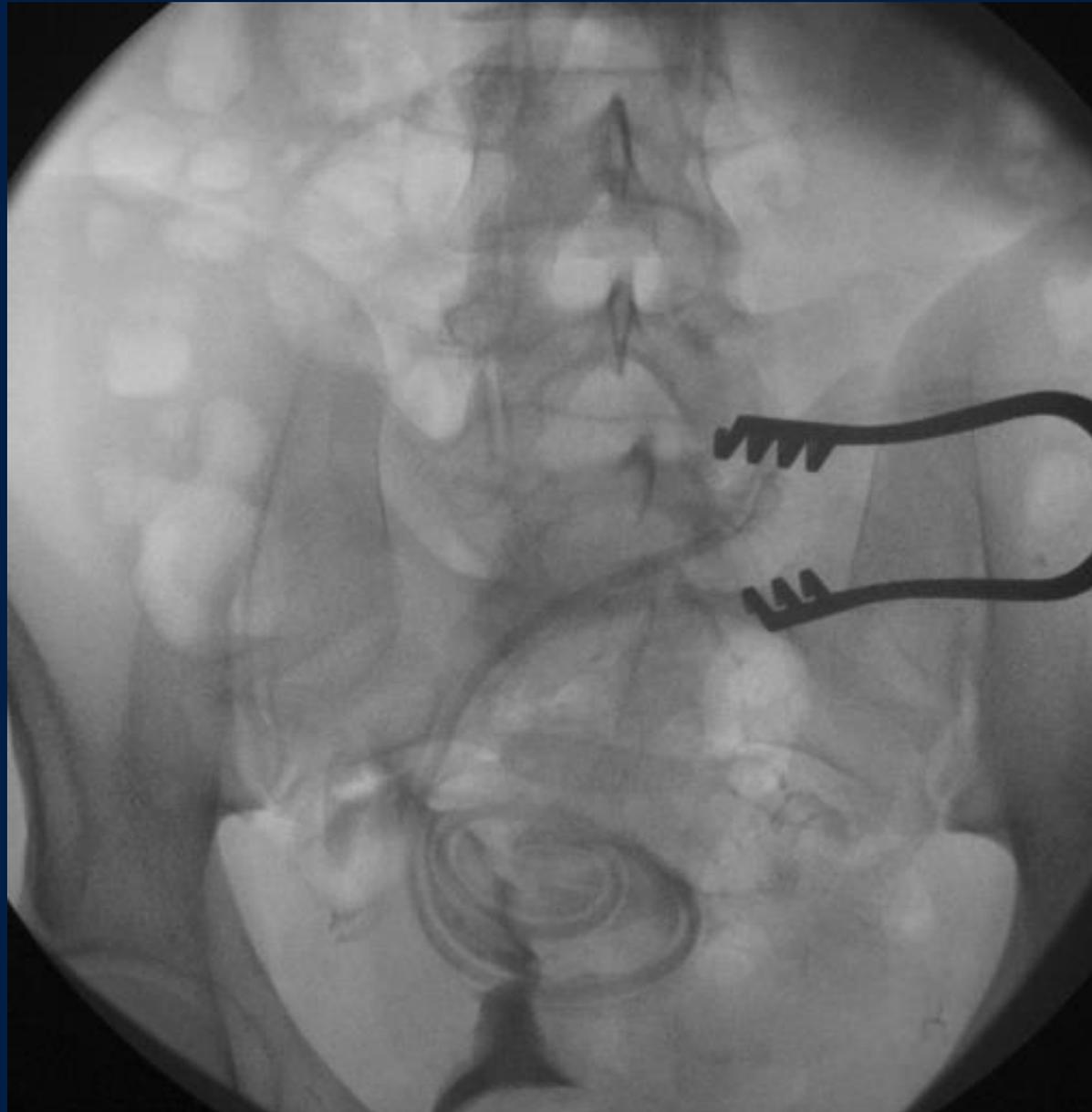


Figure 70. Photo courtesy of Dr.Micah Chan

# FLUOROSCOPIC GUIDED PERCUTANEOUS INSERTION PROCEDURE<sup>12,13</sup>

## CONTINUED

11. Check flow by infusing/draining of 2L of dialysate solution to ensure sufficient inflow and outflow.
12. Suture the catheter's **entry** incision if appropriate
13. Catheter can be used immediately with **low volumes** in supine position for urgent start or can be left for a period of up to 10 days to allow for wound healing and minimize the risk of pericatheter leak

<sup>12</sup> Abdel-Aal, et al., 2011

<sup>13</sup> Arabi et al., 2017

# IMPACT OF INSERTION METHOD ON CATHETER DYSFUNCTION

Reported Dysfunction Outcomes from Studies In Adult Patients <sup>2</sup>	
Open Surgical	4.4 - 38%
Basic Laparoscopic	2 - 11%
Advanced Laparoscopic*	0 - 14%
Advanced Laparoscopic**	0 - 4.6%
Percutaneous: Fluoroscopic Guided	1.5 - 7.0%
Percutaneous: Peritoneoscopic	2.5 - 17.6%

\*Incorporating lysis of adhesions and either catheter fixation or omentopexy

\*\*Incorporating lysis of adhesions, peritoneal tunnel, and omentopexy

<sup>2</sup> Haggerty, et al. 2014.

# COMPARISON OF OUTCOMES PERCUTANEOUS VS SURGICAL

## Fluoroscopically Guided Percutaneous Method Versus Directly Visualized Surgical Method<sup>14</sup>

- Retrospective cohort analysis
- Fluoroscopic guidance (FG) vs Direct visualization surgical (DV) methods
- n=101
  - 52 FG
  - 49 DV

<sup>14</sup> Rosenthal, et al. 2008.

# COMPARISON OF OUTCOMES PERCUTANEOUS VS SURGICAL CONTINUED<sup>14</sup>

- No differences in early and late exit site infection and tunnel infections
- Late peritonitis rates lower in percutaneous placement group (20%) than in direct the visualization group (42%). (p=0.018)
- Complication rates for catheter leakage, malfunction, malposition, and bleeding were lower in the fluoroscopic group, but not statistically significantly lower. (p=0.93, 0.73, 0.20, and 0.21, respectively)
- "PD access-related procedures can be safely and successfully performed percutaneously with fluoroscopic guidance with outcomes comparable—and perhaps superior to—those of directly visualized surgical methods"

<sup>14</sup> Rosenthal, et al. 2008

# OUTCOMES

## FLUOROSCOPIC PERCUTANEOUS PLACEMENT

### Percutaneous Placement Under Fluoroscopic Guidance<sup>15</sup>

- Prospective study
- n=38 (40catheters)
- Placed at bedside by nephrologist
- Procedure completed in average of 24 minutes with 97.5% (n=39) successrate

<sup>15</sup> Al-Hwiesh.2014.

# OUTCOMES

## FLUOROSCOPIC PERCUTANEOUS PLACEMENT CONTINUED<sup>15</sup>

- No bowel perforations or hemorrhages occurred
- Complications
  - Poor initial drainage: 12.5% (n=5)
  - Exit site infections
    - ≤1 month: 5.0% (n=2)
    - ≤12 months: 12.5% (n=5)
  - Peritonitis: 5.0% (n=2)
  - Catheter migration: 7.5% (n=3)
  - Pericatheter early (<2 weeks) leakage: 2.5% (n=1)
- Catheter survival
  - 95.0% at 6 months
  - 87.5% at 12 months
- Author concluded percutaneous placement safe for placement of PD catheters

<sup>15</sup> Al-Hwiesh.2014.

# META-ANALYSIS

## PERCUTANEOUS VS SURGICAL INSERTION OF PD CATHETERS

Percutaneous versus surgical insertion of PD catheters in dialysis patients<sup>16</sup>

- 13 studies (2,681 subjects)
  - 10 retrospective
  - 2 prospective non-randomized
  - 1 prospective randomized

	CI	RR, OR, or IRR	p-value	
1 year catheter survival	95%CI (0.59-1.11)	RR=0.81	p=0.19	No significant difference
Catheter dysfunction	95%CI (0.57-1.29)	Pooled odds ratio (OR)=0.86	p=0.46	No significant difference
Peritoneal fluid leak	95%CI (0.58-2.09)	OR=1.10	p=0.77	Similar for the two groups
Peritonitis per patient month	95%CI (0.62-0.96)	Incidence rate ratio (IRR)=0.77	p=0.02	Significantly lower incidence in percutaneous-placed group

<sup>16</sup> Boujelbane, et al., 2015

# SUMMARY

- Several options for PD catheter placement exist including: open, laparoscopic, and percutaneous<sup>1</sup>
- There are advantages and disadvantages to each option
- The goal of insertion is to minimize both insertion complications and catheter dysfunction long term<sup>2</sup>
- Some strategies to meet this goal include: patient land marking, determining the surgical insertion site, planning the subcutaneous catheter tunnel and patient preparation<sup>7</sup>
- When performing the laparoscopic insertion technique there may be opportunity for adjunct interventions such as omentopexy, adhesiolysis, and epiploectomy, which may assist with both preventing and resolving some mechanical catheter insertion complications<sup>2,8,17</sup>

<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggerty, et al., 2014

<sup>7</sup> Crabtree et al, 2005

<sup>8</sup> Crabtree, 2006

<sup>17</sup> Crabtree, 2014

# SUMMARY

## CONTINUED

- Surgery continues to be a popular method of insertion, but placements by nephrology or interventional radiology using laparoscopy are increasing in popularity<sup>2,4</sup>
- PD catheters inserted by laparoscopy technique have increased to nearly 50% in 2012 from 26% in 2007<sup>17</sup>
- Fluoroscopic guidance provides additional support for insertion and visualization of key structures during placement<sup>1,2</sup>
- Rates of complications are variable and largely dependent on the expertise of the inserting physician and faculty<sup>2,4</sup>
- Guidelines recommend the selection of a technique consider the experience and confidence of the inserter <sup>2</sup>

<sup>1</sup> Argyle™\* IFU, 2018

<sup>2</sup> Haggerty, et al., 2014

<sup>4</sup> Abdel-Aal, et al. 2014

<sup>17</sup> Crabtree, 2014

# GENERAL WARNINGS AND PRECAUTIONS<sup>1</sup>

- Sterile technique to be observed at all times when handling the catheter or insertion components
- Catheter and kit components intended for **single patient use**
- Argyle™\* catheters **cannot** be cleaned/sterilized adequately by the user for safe reuse. Attempts to clean or sterilize may result in bio-incompatibility, infection or product failure risks to the patient
- **DO NOT use acetone, or any solution containing acetone, on any part of the catheter as it may cause catheter damage**
- **Aqueous-based povidone-iodine (PVP) is recommended**
- **DO NOT** instill any PVP solution into the proximal end of the catheter; could shorten catheter life span
- Avoid injuring the abdominal viscera during insertion. Do not use excessive force when inserting the catheter
- Confirm correct tip placement before beginning the subcutaneous tunnel

<sup>1</sup> Argyle™\* IFU, 2018

# GENERAL WARNINGS AND PRECAUTIONS<sup>1</sup>

- Use the guidewire straightener to insert the 'J' end of the guidewire into the introductory needle
- **DO NOT** insert or withdraw the guidewire forcibly from any component; wire could break or unravel
- **Do not** over-tighten connection as this may cause adaptors to crack
- Change the clamp location regularly to prolong the life of the catheter. Avoid clamping near the adaptor or repeatedly in the same location
- Use only smooth-jawed forceps for clamping when not using supplied catheter clamps
- Patients with abdominal wall hernias should be diagnosed and hernias **repaired before or at the same time as the catheter insertion**
- Peritoneal dialysis may be initiated in patients with intraabdominal foreign bodies such as after open abdominal aortic aneurysm graft repair, but a 4-month waiting period recommended

<sup>1</sup> Argyle™\* IFU, 2018

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See the device manual for detailed information regarding the implant procedure, indications, contraindications, warnings, precautions, and potential complications/adverse events.

For further information, please call Medtronic, in the United States call 800-962-9888 and for international inquires, call 508-261-8000, and/or consult Medtronic's website at [www.medtronic.com/covidien](http://www.medtronic.com/covidien).

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