

# Creating Optimal Peritoneal Dialysis Access

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**Shiva Seyrafian, M.D., Nephrologist**

**Isfahan University of Medical Sciences,  
Isfahan, Iran**

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# Optimal Peritoneal Dialysis Access

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- ❖ The success of peritoneal dialysis (PD) depends on a safe, functional, and durable catheter access to the peritoneal cavity provided in a timely fashion.
- ❖ Catheter complications often lead to catheter loss and contribute to technique failure

# Basics for Optimal Peritoneal Dialysis Access

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- ❖ Catheter selection
- ❖ Patient preparation
- ❖ Insertion site
- ❖ Catheter placement
- ❖ Exit site

# Commonly used peritoneal catheters

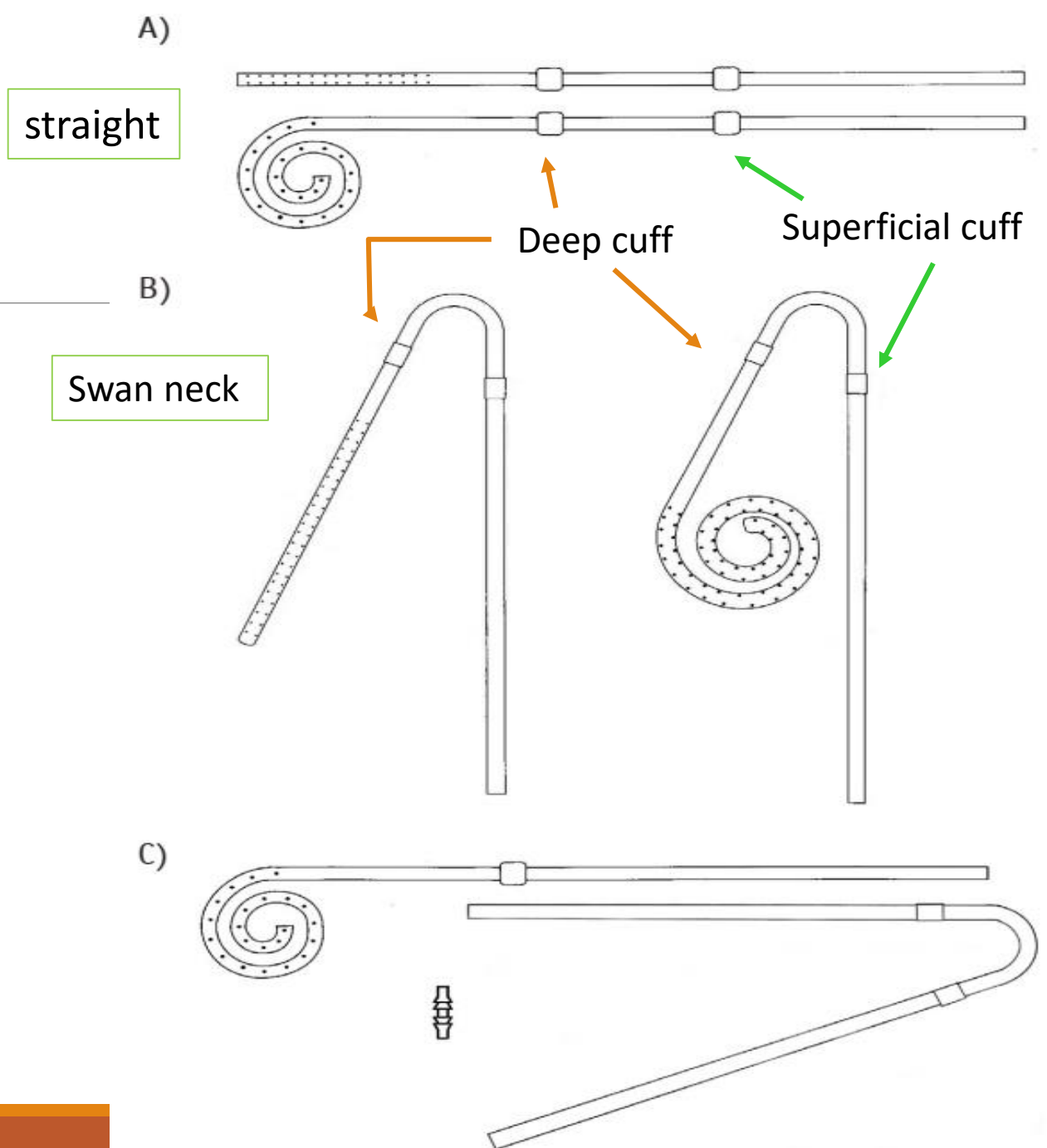
Silicone rubber  
Double dacron (polyester) cuffs  
(deep

and superficial cuff)

Straight inter-cuff segment

Swan neck bend inter-cuff segment

2-pieces extended catheter



# CATHETER SELECTION

Belt line	Suprapubic catheters
Obesity,	Gastrostomy tubes
Skin creases and folds	Incontinence,
Presence of scars,	Physical limitations
Chronic skin conditions	Bathing habits
Intestinal stomas	
If the patient prefers to sleep on a particular side, catheter placement may be better tolerated on the opposite side of the abdomen	

# The most appropriate choice of catheter

1. Balance of pelvic location of the catheter tip,
2. Exit-site easily visible to the patient,
3. Can be inserted through the abdominal wall with the least amount of tubing stress.

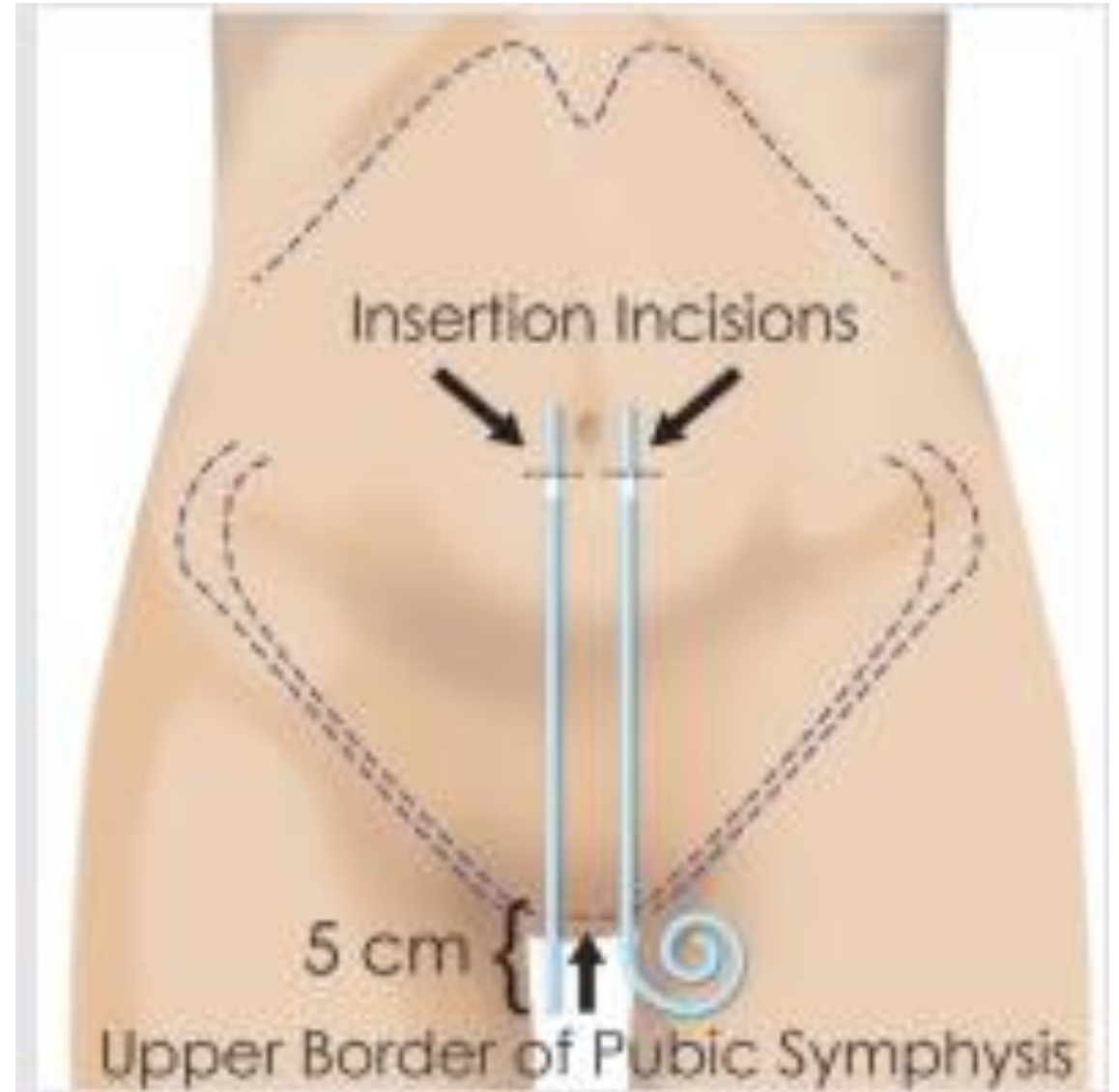
## **Poor catheter choice:**

1. Flow dysfunction,
2. Flow pain, and
3. Exit-site locations prone to infection or inconvenience to the patient

## Determination of the insertion site:

With the patient in the supine position, the insertion site for each style and size of catheter is determined by marking the upper border of the deep cuff in the paramedian plane when the upper border of the catheter coil is aligned with the upper border of the pubic symphysis.

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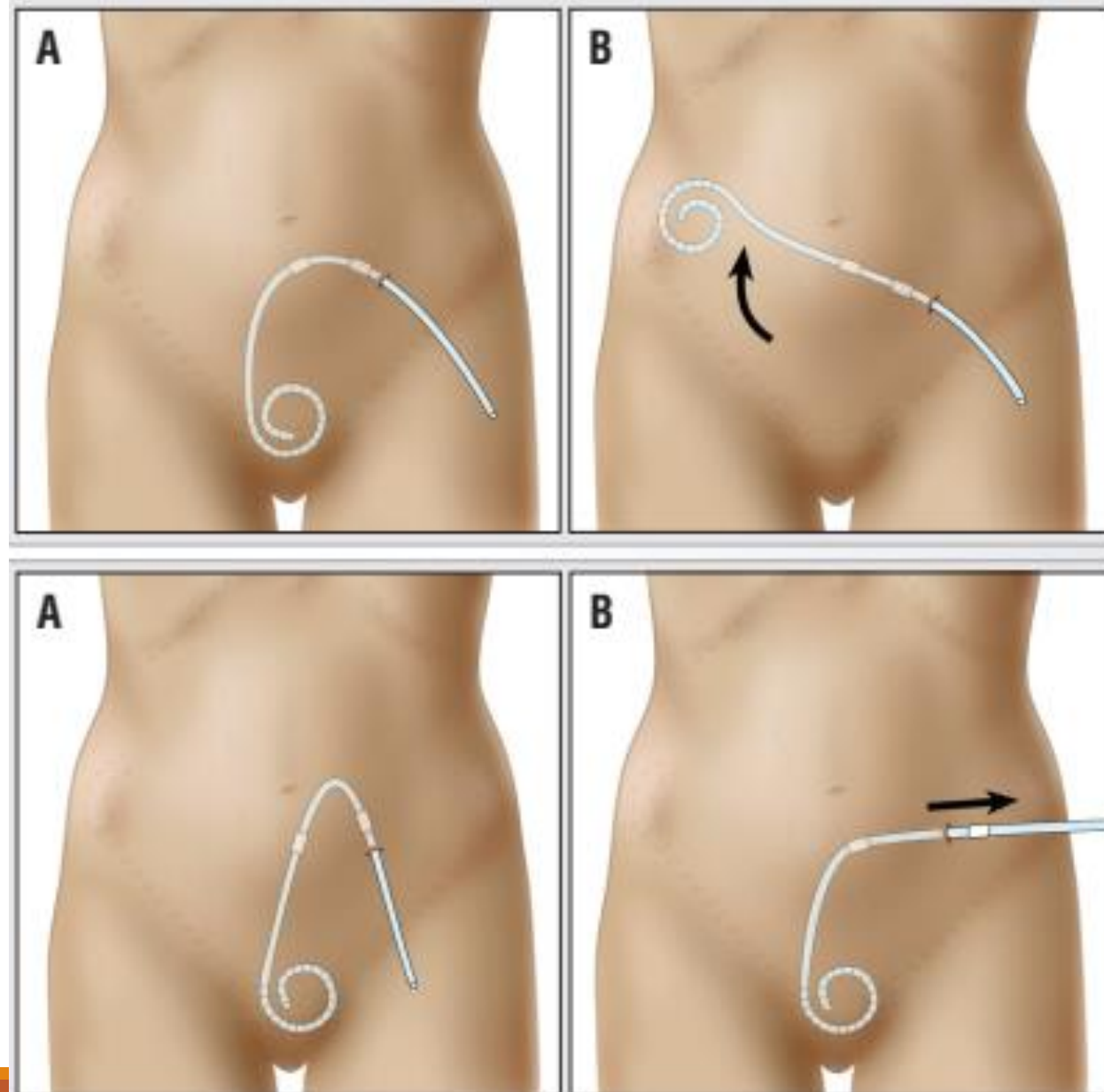


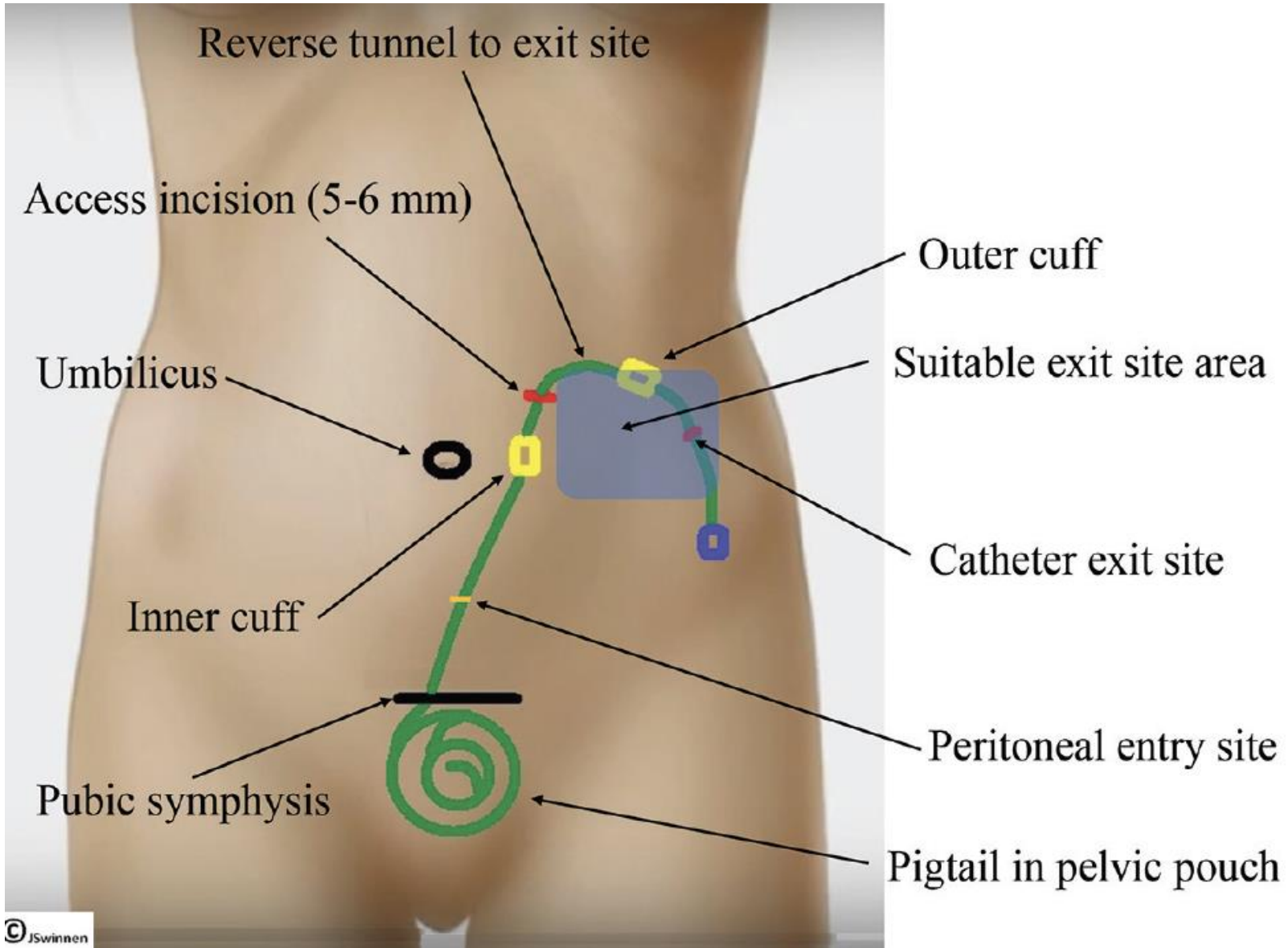
## 2- Determining the exit site:

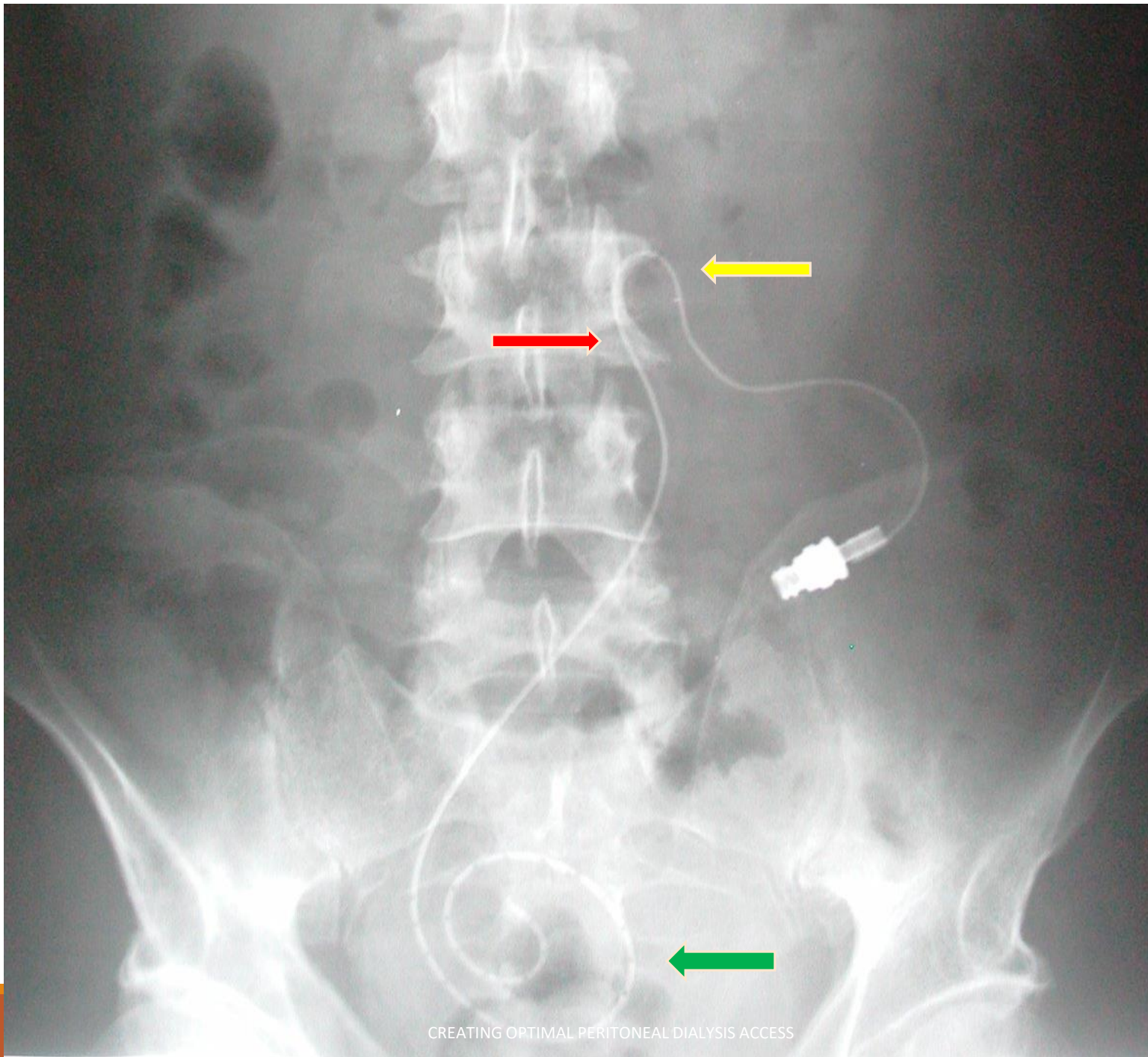
Exit-site location 2 to 4 cm beyond the superficial cuff in line with the external limb of the catheter.



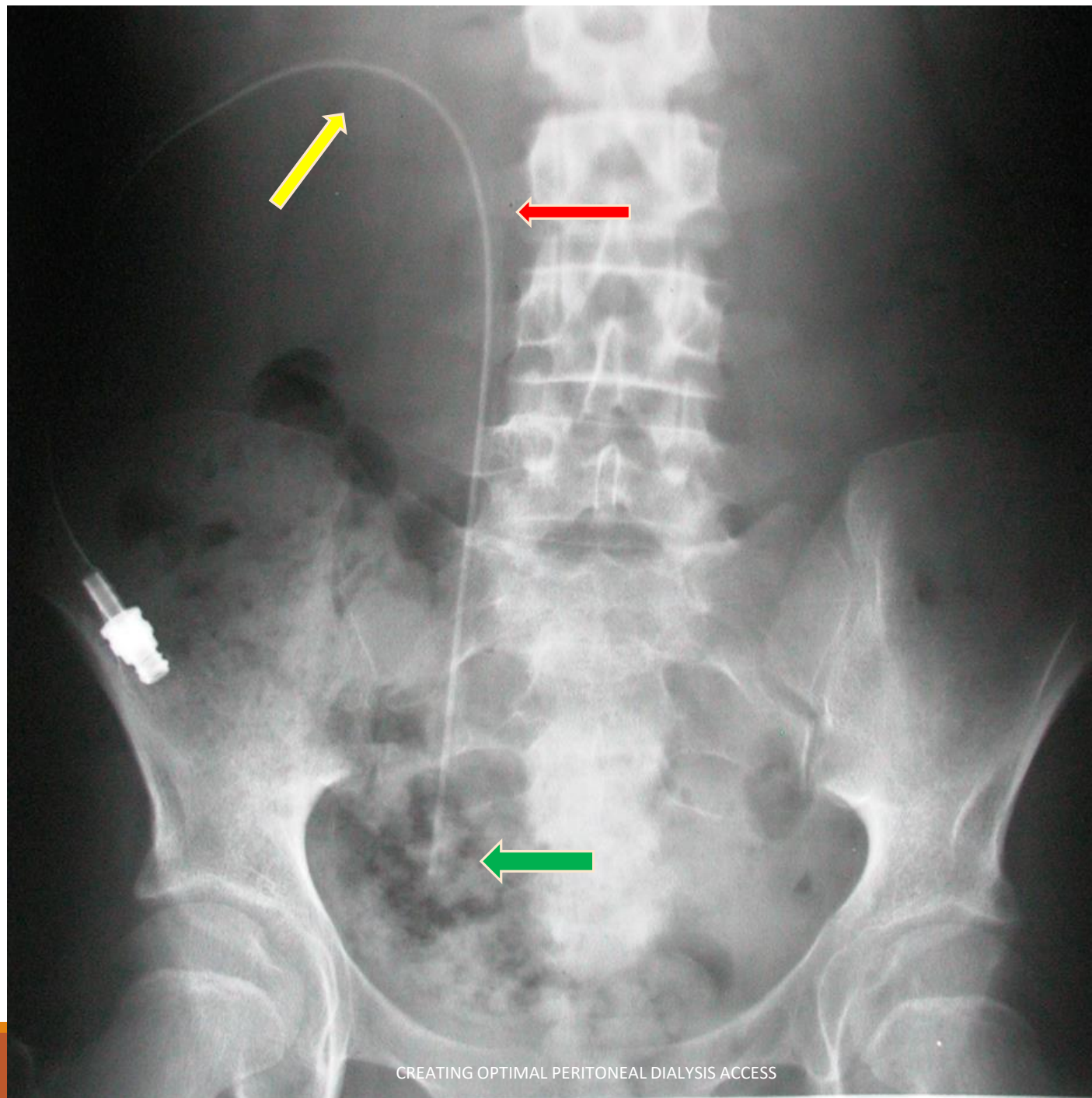
**Straight inter-cuff  
segment**





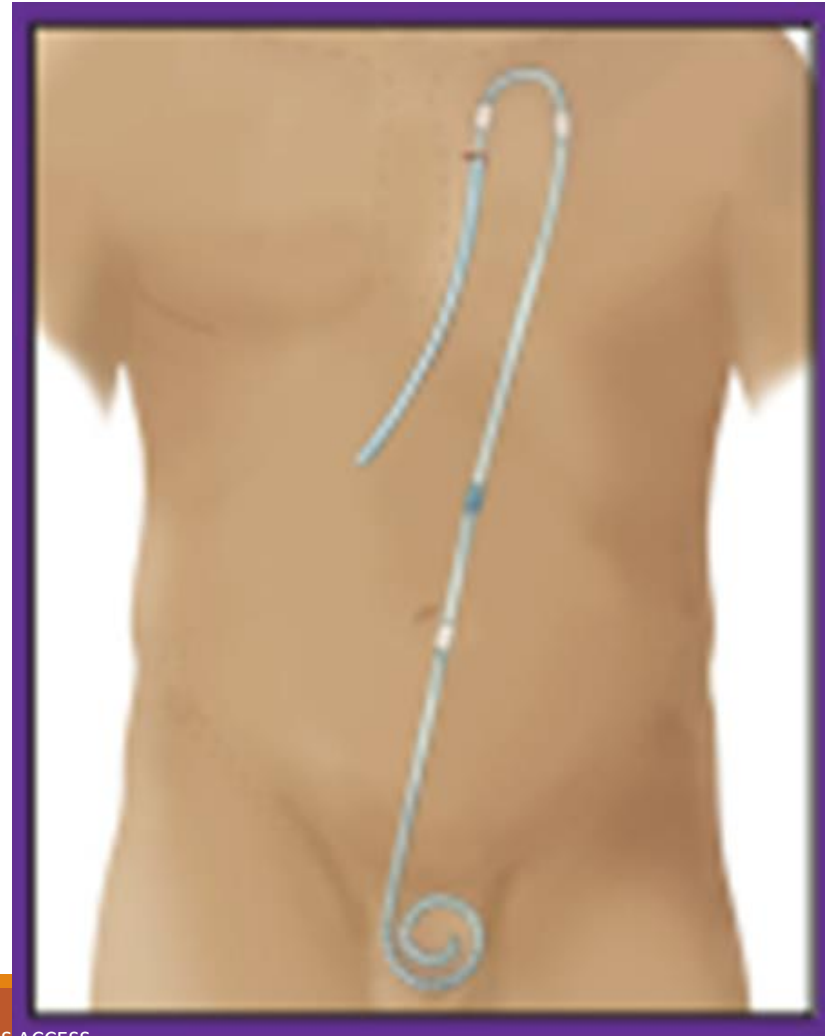
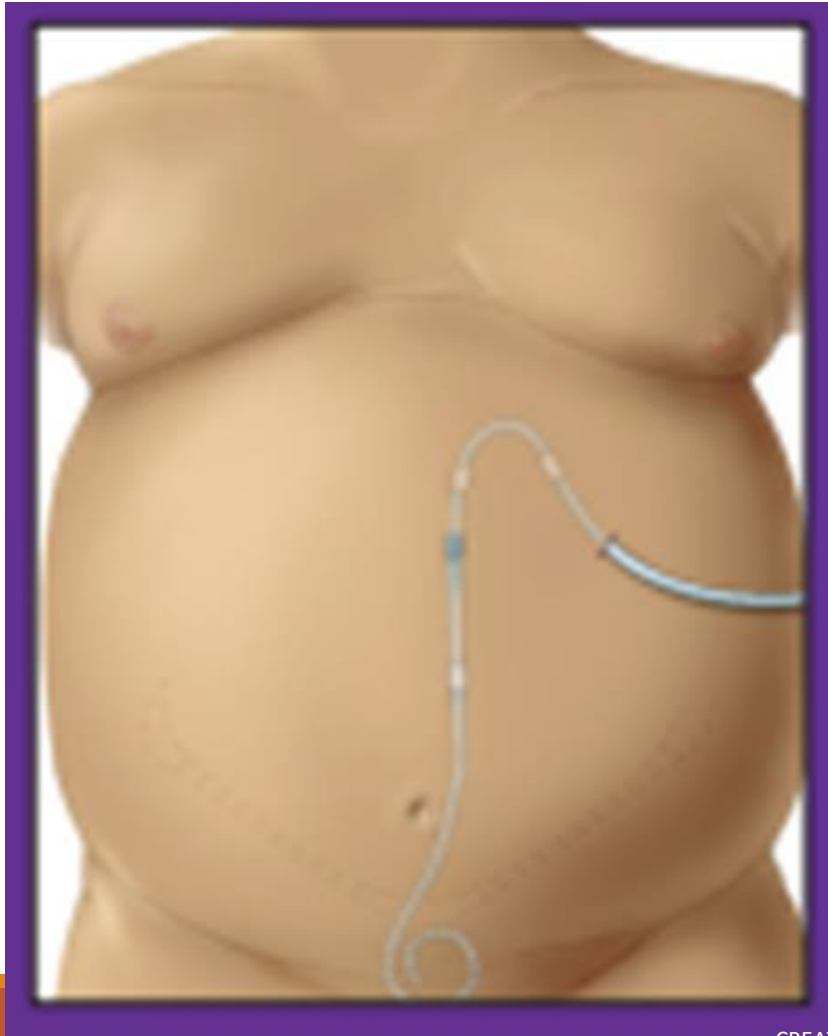


CREATING OPTIMAL PERITONEAL DIALYSIS ACCESS



CREATING OPTIMAL PERITONEAL DIALYSIS ACCESS

**Presternal exit sites:** by connecting an extender catheter to the PD catheter and creating a presteral exit site.



# Indications for extended catheters or presternal catheters

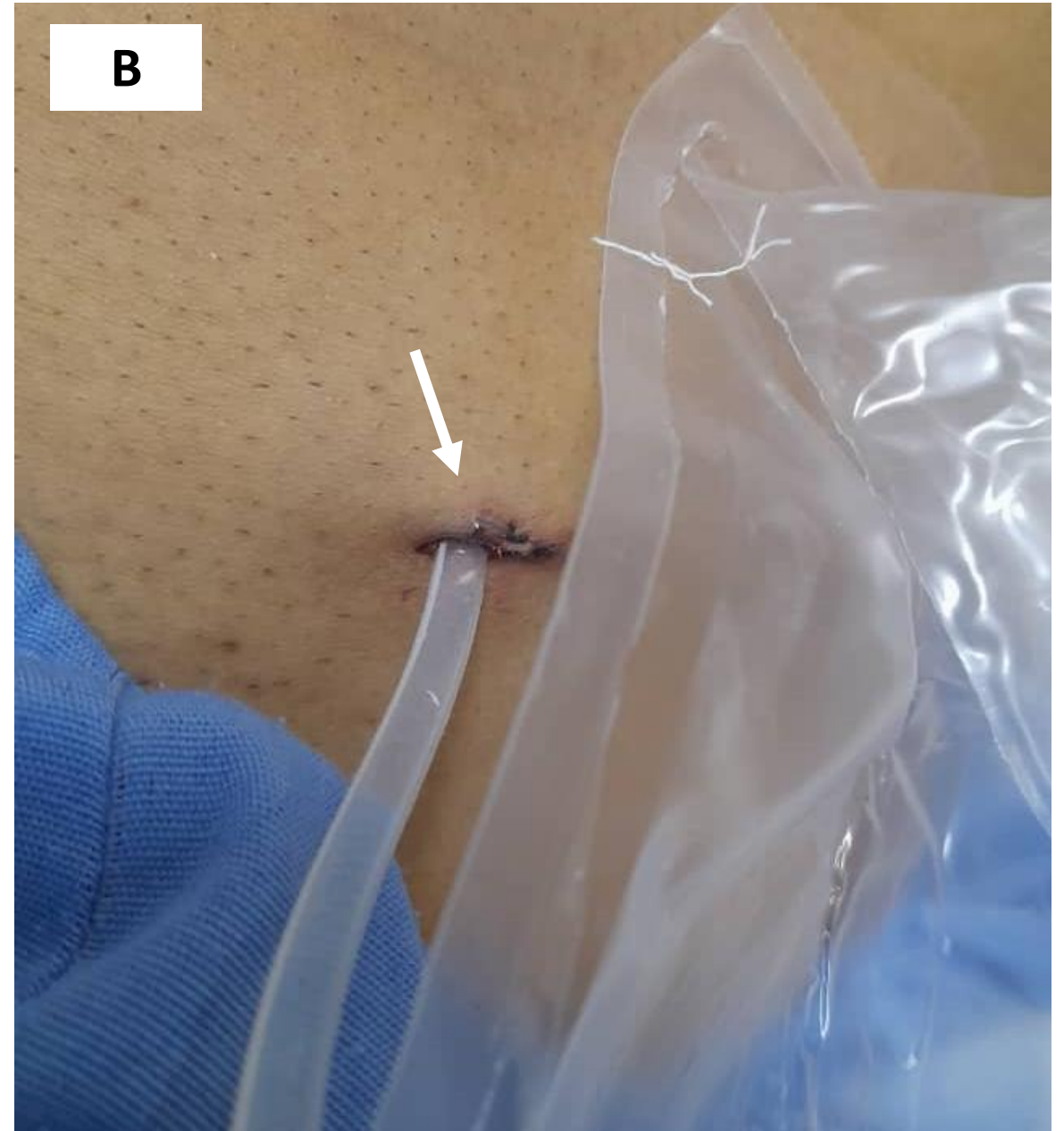
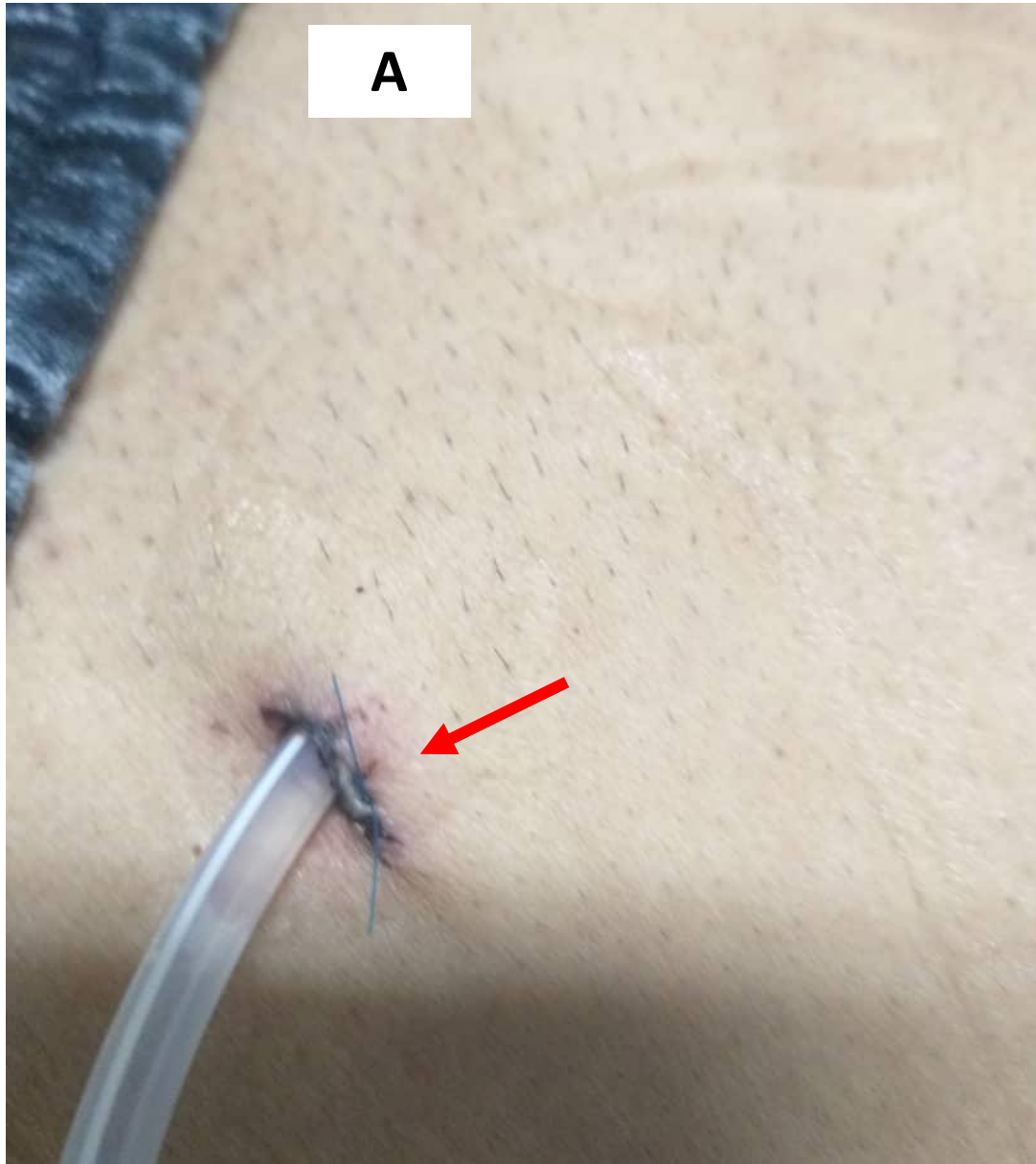
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1. Obesity
2. Incontinence
3. Presence of intestinal stomas
4. Gastrostomy tubes
5. Suprapubic catheters
6. Take a deep tub bath without risk of exit-site contamination

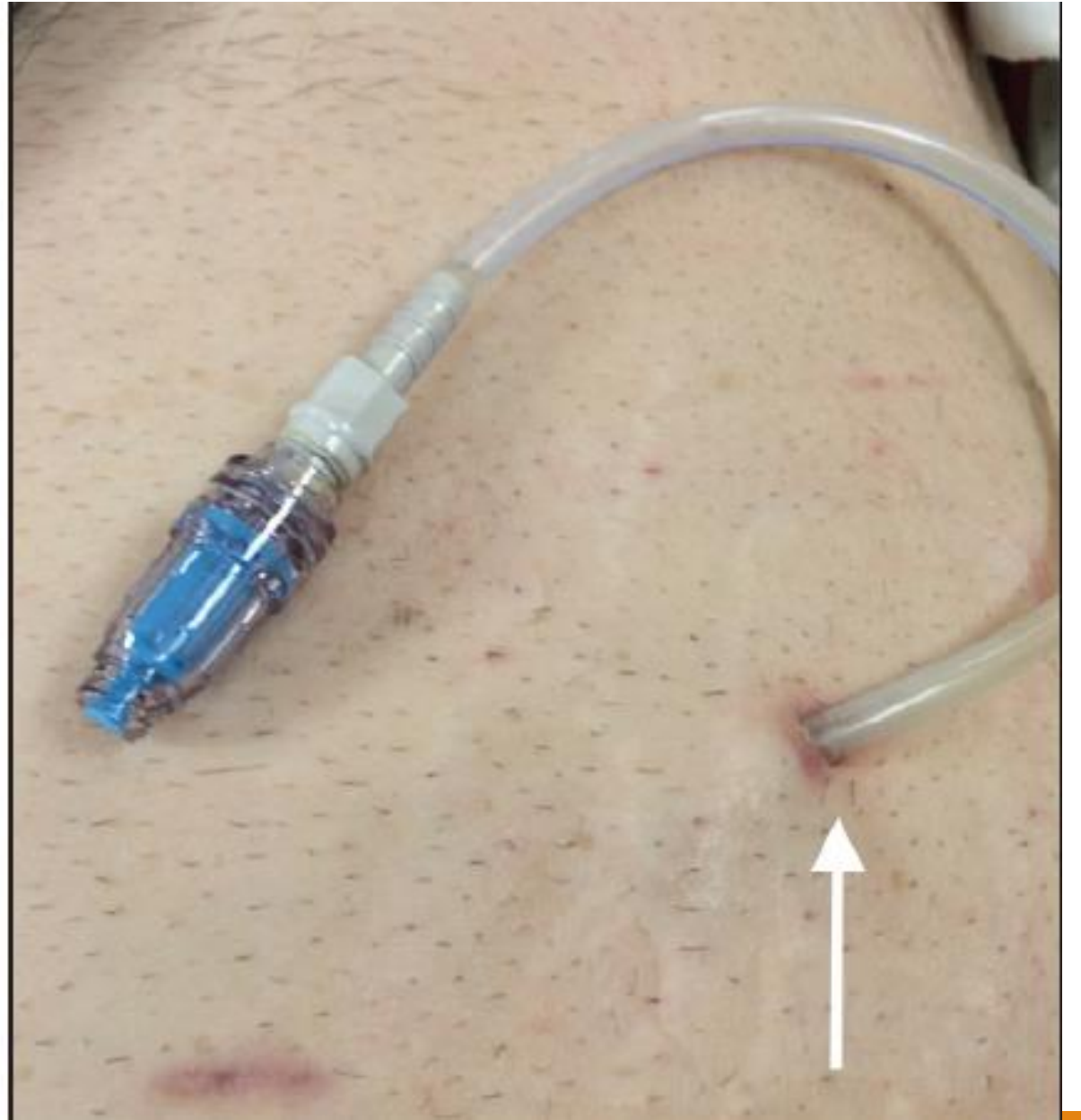
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# Exit Site Characteristics

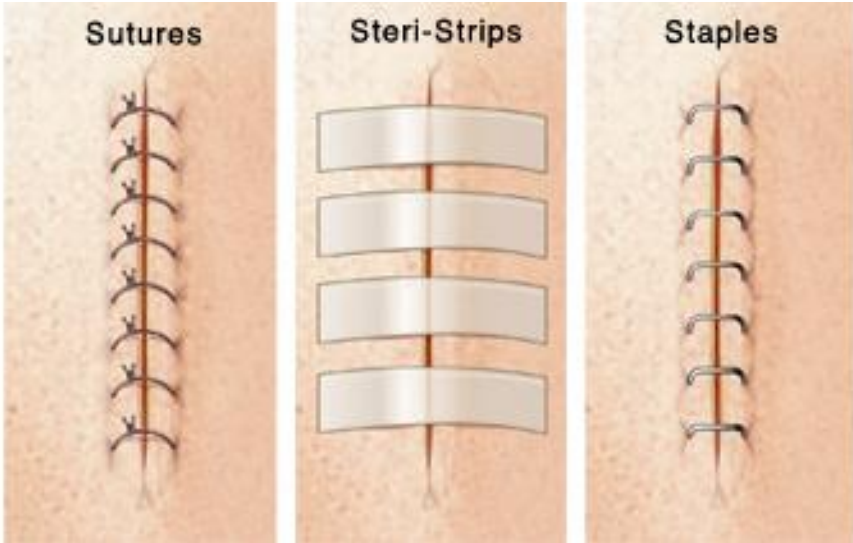
- ❑ Creation of a good exit site.
- ❑ Maintain a **sterile exit site**.
- ❑ **Sutures should be avoided** due to the risk of foreign body reaction; rather, Steri-Strips should be used.
- ❑ Directed **downwardly or laterally** and **away from the belt line** or skin folds.
- ❑ **Upwardly** directed **exit-sites should be avoided** (pooling of cutaneous bacteria and debris, perspiration, and shower water in the exit sinus, predisposing exit-site and tunnel infection)
- ❑ Crucial the **patients can see** and **reach the exit site**.





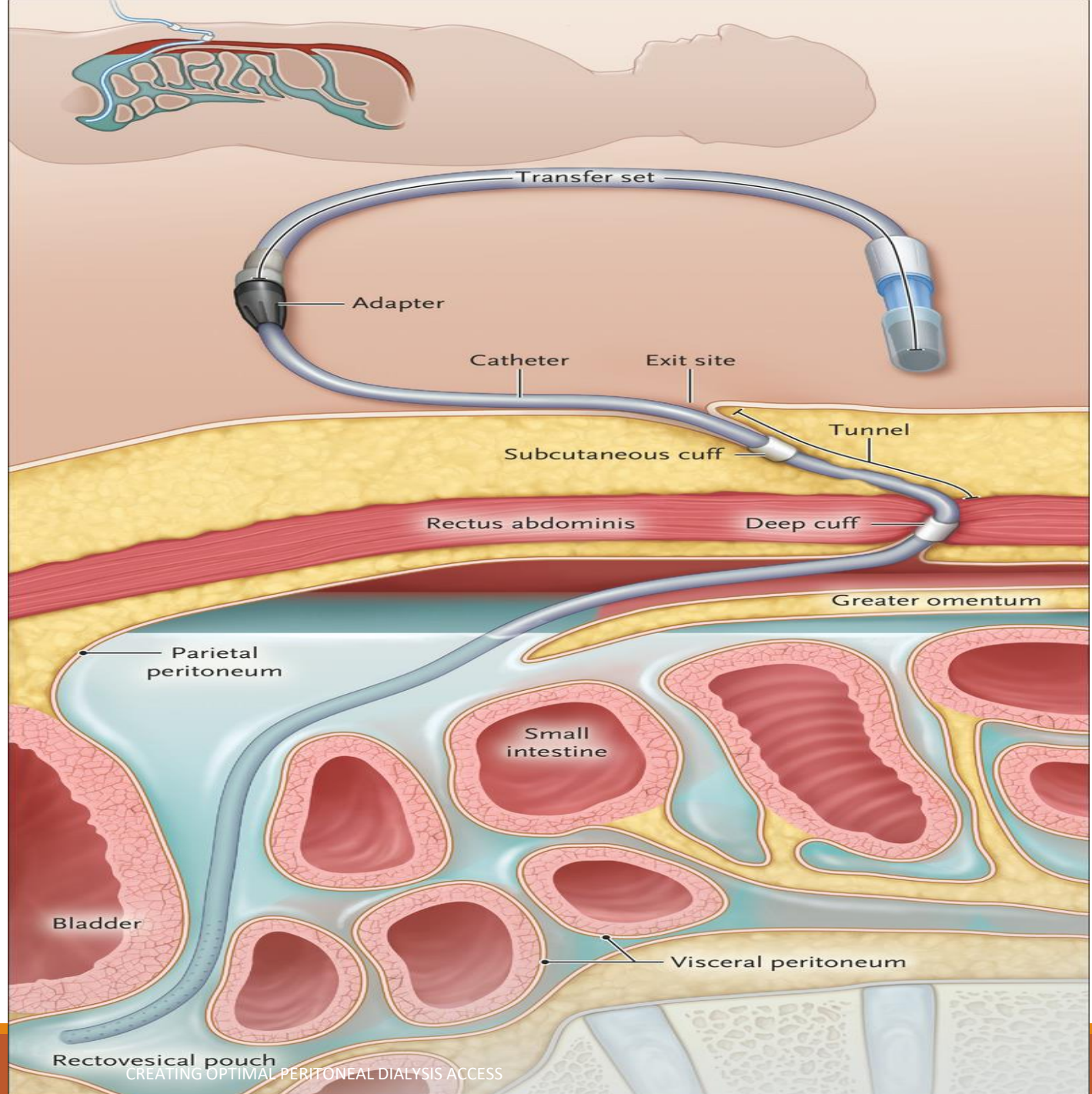


# Steri-Strips

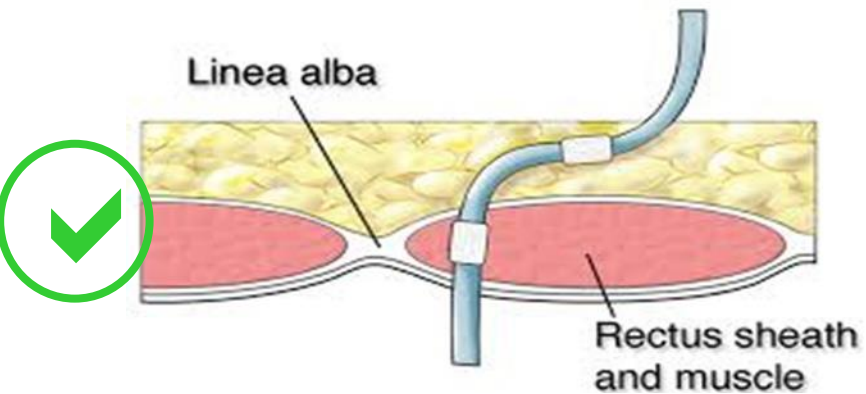




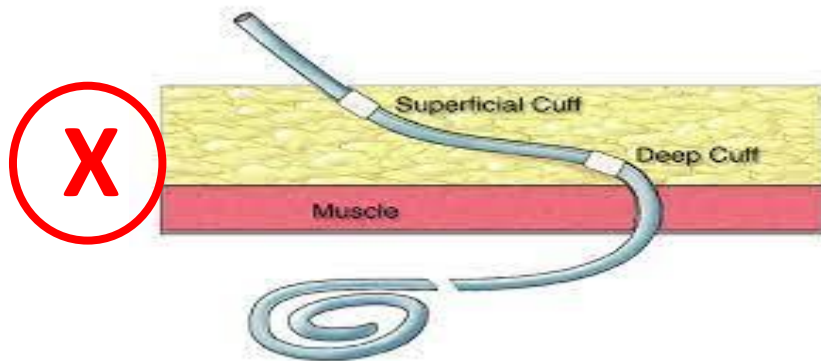




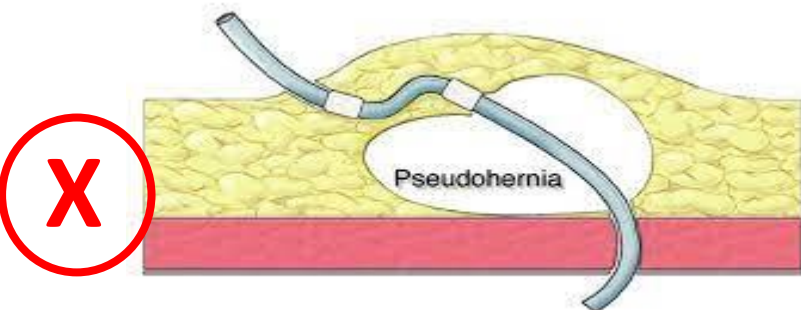
# Paramedian approach with deep cuff resting within the muscle.



Paramedian insertion through body of rectus muscle and sheath to provide optimal catheter immobilization and minimize risk of pericatheter leak and hernia



Deep catheter cuff implanted external to the fascia. The mesothelium from the peritoneal surface reflects along the surface of the catheter to reach the deep cuff.



The extension of the peritoneal lining above the muscle layer creates the potential for a pseudohermia and pericatheter leak. If the abdominal wall is weak, the track may dilate and develop a true hernia.

# Preoperative and postoperative PD catheter insertion care

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## Before Surgery

- ❑ The catheter placement procedure will be thoroughly explained.
- ❑ Marking of the catheter site (determination of the optimal location, i.e., away from the belt line, within easy reach and sight, right or left side).
- ❑ Shower with a disinfectant soap on the day of surgery

# Preoperative and postoperative PD catheter insertion care

## Before Surgery...

- ❑ Bowel preparation (if required) (e.g., polyethylene glycol solution, enema, or a stimulant suppository administered beginning a day or two before the procedure depending on the severity of symptoms).
- ❑ Fast after midnight or at least 8 hours prior to catheter insertion (essential medications are permitted with a sip of water)
- ❑ Empty bladder



# Anesthesia

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## 1. Local

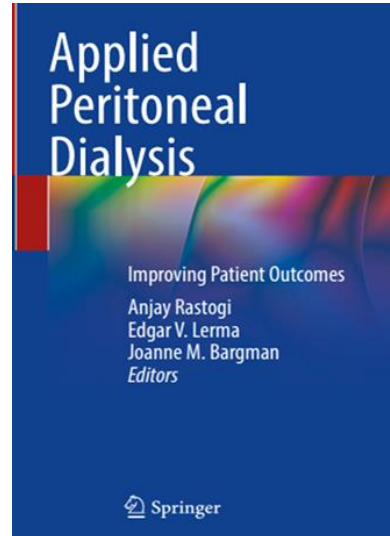
- a) Open surgical dissection
- b) Peritoneoscopic Procedure
- c) Percutaneous Needle-Guidewire Technique

## 2. Regional

- a) Open surgical dissection

## 3. General

- a) Open surgical dissection
- b) All laparoscopic procedures.



1. Optimal PD Access: 2019 guidelines, PDI 2009-VOL 39.NO.5

2. Applied Peritoneal Dialysis, Rastogi A, Lerma E V. J M Bargman , Springer, 2021

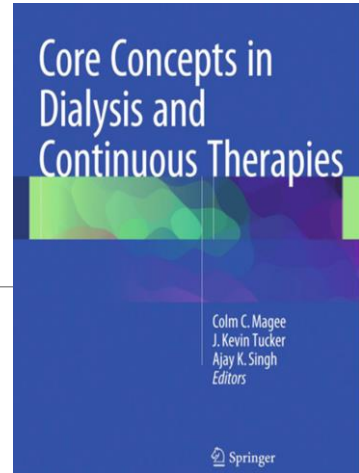
# Implantation Technique

The implantation procedure is as important as catheter characteristics for long-term catheter performance.

## The surgical technique:

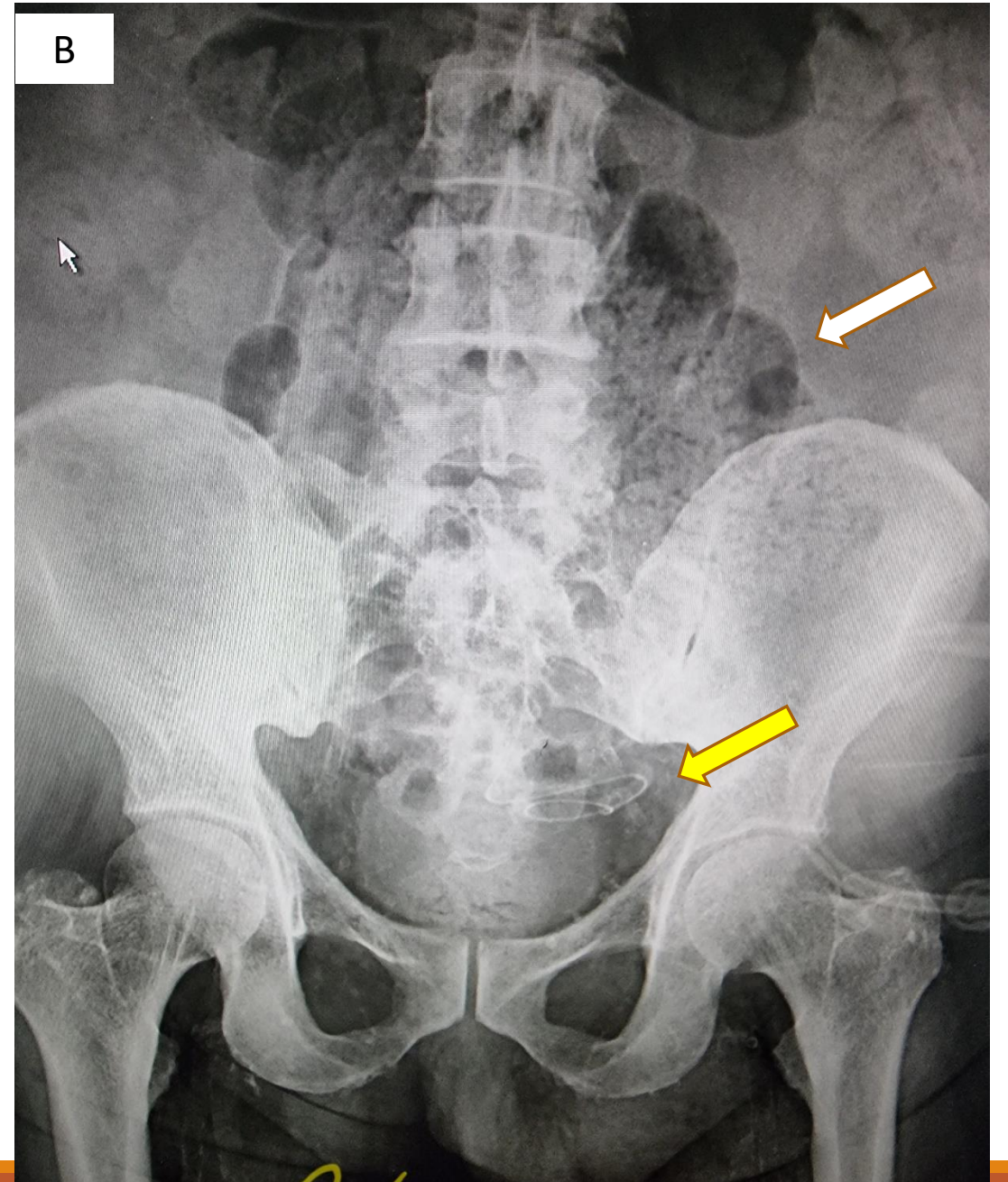
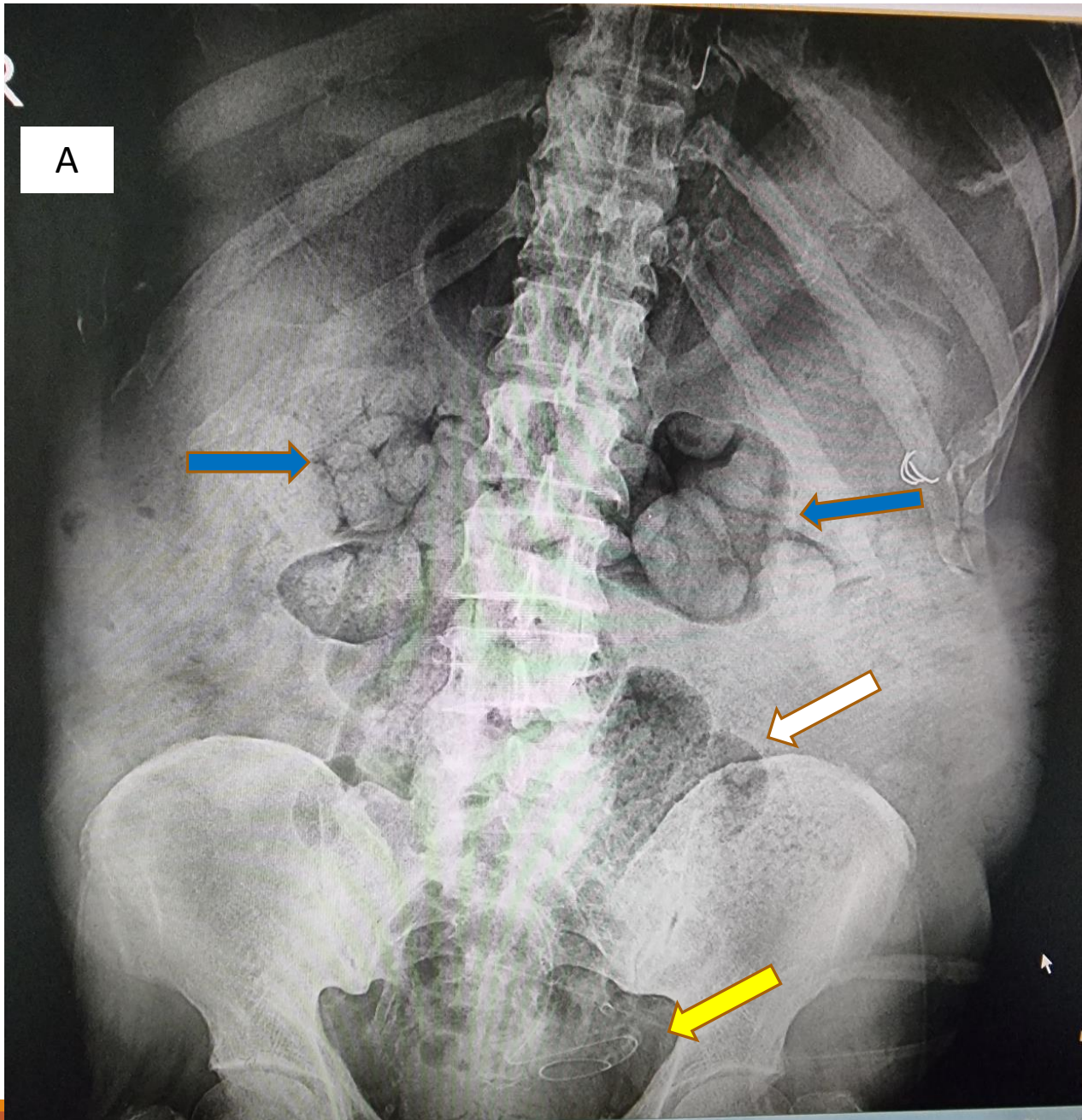
1. Blindly (more complications, such as bowel injury, inability to simultaneously repair hernias or perform omentopexy )
2. Laparoscopic
3. Open surgical approach.

Core Concepts in Dialysis and Continuous Therapies, Magee c. c., Tucker J. K., Singh A. K., Springer, 2016



# Implantation Technique

1. The catheter tip should lie in the true pelvis.
2. If the tip higher, risk for omental entrapment and catheter dysfunction.
3. Placement in the left pelvis preferred, peristalsis push the catheter in a downward direction.
4. Tip migration often with constipation.
5. If relief of constipation does not revert, surgical correction return the tip to the pelvis without requiring a new catheter.



# Implantation Technique

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## Laparoscopic procedure:

Omental entrapment often impairs catheter drainage,

1. Omentectomy: prophylactic removal of omentum increases the complexity of the surgery

Most patients never have omental entrapment.

2. Omentopexy: the surgeon first examines the omentum to see if it will border the catheter tip in the pelvis, omental–catheter interactions in the pelvis, an omentopexy is performed.

# Implantation Technique

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3. Colopexy: Redundant and bulky rectosigmoid colon blocking the pelvic inlet can be suspended along the lateral abdominal wall
4. Hernia repairment: Previously unsuspected abdominal wall hernias can be identified and repaired at the time of the catheter implantation procedure

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# Implantation Technique

## ➤ TESTING HYDRAULIC FUNCTION

Patency and flow function before accepting intraperitoneal placement of the catheter and ending the procedure.

- 500 to 1,000 mL of saline or dialysate and observing for unimpeded inflow and outflow, allowing a 100- to 200-mL residual volume
- Repositioning the catheter may potentially resolve the flow dysfunction,

## ➤ POSTOPERATIVE CATHETER FLUSHING

Dialysate or saline solution weekly, using 500- to 1,000-ml volumes, until dialysis is initiated (prevent fibrin or blood clot obstruction )

# Implantation Technique

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## SURGICAL DRESSINGS:

- Immobilization of the catheter (prevent trauma and contamination of the exit site)
- Nonocclusive gauze dressings (prevent drainage wicked away from incision and exit site)
- Cover the insertion incision and exit site
- The transfer set taped securely to the abdomen, separate from the dressing





Source: The authors of this article: Van den Berg, H.R., O'Hagan, S, Hurter, D.  
FIGURE 9: Peritoneal dialysis catheter after being covered with dressings.

# Implantation Technique

## SURGICAL DRESSINGS:

- **Not** be changed for **5 to 10 days** unless bleeding or infection
- **Changes** restricted to **experienced PD staff**, or trained patients
- **Not showering** (prevent contamination and infection, until PD nursing staff it is safe to do so.

## postoperative PD catheter insertion care

### After Surgery

- ❑ Avoid high intra-abdominal pressure until healed (2 to 6 weeks): heavy lifting, stair climbing, straining, and constipation.
- ❑ Report bleeding, pain, or tenderness immediately
- ❑ Report severe cough

### ➤ CATHETER BREAK-IN PROCEDURES:

- ❑ A break-in period of at least 2 weeks before elective start on PD

# COMPLICATIONS OF PERITONEAL CATHETERS

## Mechanical complications

### 1. Cuff Extrusion

We suggest that superficial cuff extrusion be managed by cuff shaving (2C) with a scalpel or avulsed from the tubing with forceps.

### 2. Early Pericatheter Leaks (<30 days following catheter implantation and the start of PD):

- ✓ Catheter implantation technique (midline site, purse string suture failure)
- ✓ The timing of PD initiation,
- ✓ Dialysate volumes used,
- ✓ Strength of abdominal wall tissues.

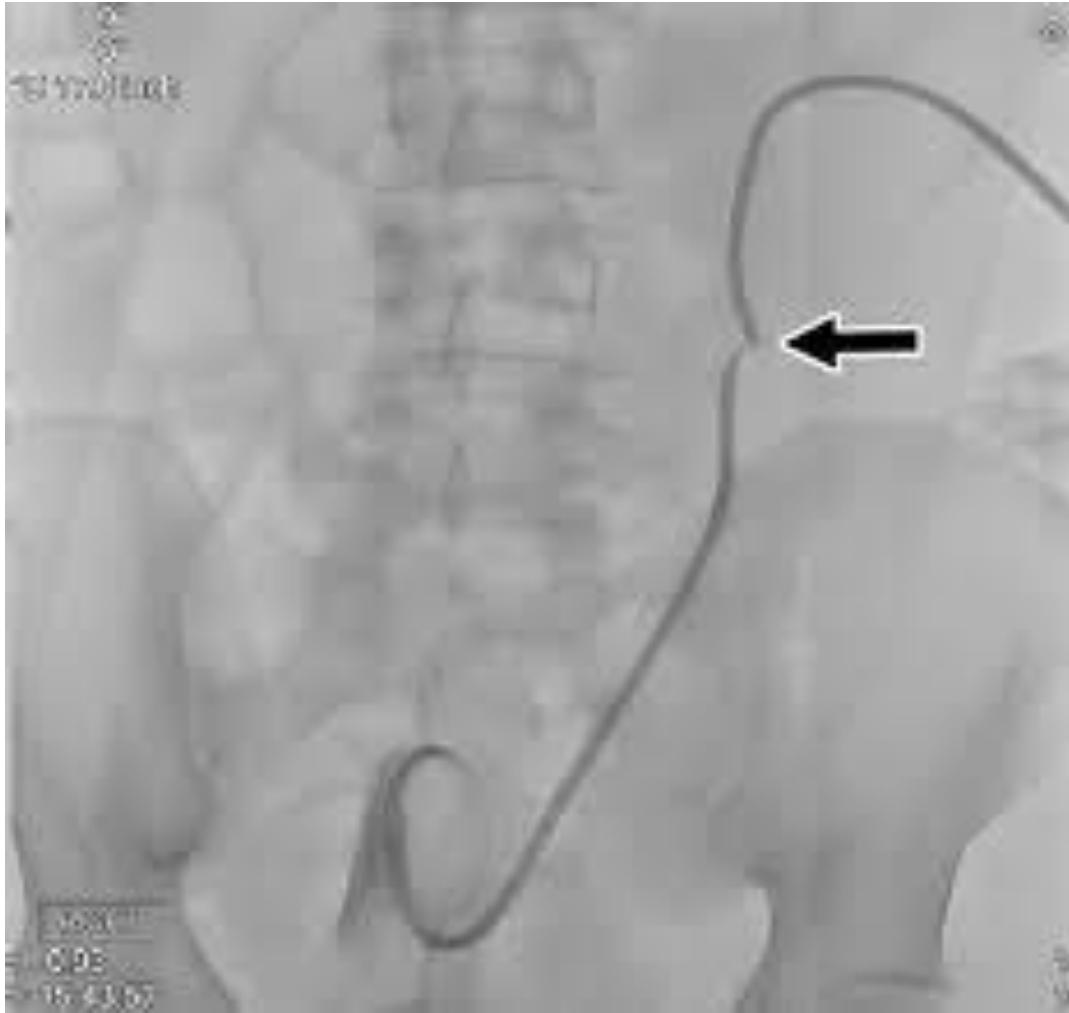
Pericatheter leakage during the first 30 days following catheter placement is often related to operator technique.



# COMPLICATIONS OF PERITONEAL CATHETERS- Mechanical complications

## 3. Flow Dysfunction And Management

- i. **Constipation** (lactulose, sorbitol, or polyethylene glycol solution)
- ii. **Bladder distention** (volume >50-100- >300 ml)
- iii. **Mechanical kinking** of the catheter (transmural segment and technical errors in catheter insertion- Lateral films of the abdomen with the patient supine and sitting/ CT scan)



# COMPLICATIONS OF PERITONEAL CATHETERS- Mechanical complications

## 3. FLOW DYSFUNCTION AND MANAGEMENT

### iv. Intraluminal fibrin clot (rTPA 1mg/ml)

no adverse consequences have been documented for catheter overflow or repeat administration.

iv. **Catheter migration** (radiologic appearance), or **Tissue attachment** (radiologically-guided manipulation, laparoscopically-directed interventions, and simultaneous catheter replacement ), replacement of the catheter is the least favorable option.







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# ISPD GUIDELINES/RECOMMENDATIONS

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## CREATING AND MAINTAINING OPTIMAL PERITONEAL DIALYSIS ACCESS IN THE ADULT PATIENT: 2019 UPDATE

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John H. Crabtree,<sup>1</sup> Badri M. Shrestha,<sup>2</sup> Kai-Ming Chow,<sup>3</sup> Ana E. Figueiredo,<sup>4</sup> Johan V. Povlsen,<sup>5</sup> Martin Wilkie,<sup>2</sup>  
Ahmed Abdel-Aal,<sup>6</sup> Brett Cullis,<sup>7</sup> Bak-Leong Goh,<sup>8</sup> Victoria R. Briggs,<sup>9</sup>  
Edwina A. Brown,<sup>10</sup> and Frank J.M.F. Dor<sup>10, 11</sup>

*Division of Nephrology and Hypertension,<sup>1</sup> Harbor-University of California Los Angeles Medical Center, Torrance, CA,*

## Best Practices in Patient Preparation and Peritoneal Catheter Implantation

1. Preoperative assessment performed by a multidisciplinary peritoneal dialysis access team to select the most appropriate catheter type, implantation technique, insertion site, and exit-site location
2. Implement bowel program to prevent perioperative constipation
3. Shower on the day of procedure with chlorhexidine soap wash of the planned surgical site
4. If hair removal is necessary, use electric clippers
5. Empty the bladder before procedure; otherwise, Foley catheter should be inserted

*(OPTIMAL PD ACCESS: 2019 GUIDELINES, PDI 2019-VOL 39.NO.5)*

## Best Practices in Patient Preparation and Peritoneal Catheter Implantation

6. Single preoperative dose of prophylactic antibiotic to provide antistaphylococcal coverage
7. Operative personnel are attired in cap, mask, sterile gown, and gloves
8. Surgical site is prepped with chlorhexidine-gluconate scrub, povidone-iodine (gel or scrub), or other suitable antiseptic agent and sterile drapes applied around the surgical field
9. Peritoneal catheter is rinsed and flushed with saline and air squeezed out of the Dacron cuffs by rolling the submerged cuffs between fingers *(OPTIMAL PD ACCESS: 2019 GUIDELINES, PDI 2019-VOL 39.NO.5)*

## Best Practices in Patient Preparation and Peritoneal Catheter Implantation

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10. **Paramedian insertion** of the catheter through the body of the rectus muscle with deep catheter cuff within or below rectus muscle
11. Pelvic location of the catheter tip
12. Placement of **purse-string suture(s) around the catheter at the level of the peritoneum** and posterior rectus sheath and/or the anterior rectus sheath
13. Subcutaneous **tunneling instrument** should **not exceed the diameter of the catheter**
14. **Catheter flow test** performed to confirm acceptable function

*(OPTIMAL PD ACCESS: 2019 GUIDELINES, PDI 2019-VOL 39.NO.5)*

## Best Practices in Patient Preparation and Peritoneal Catheter Implantation

15. Exit site located  $\geq 2$  cm beyond superficial cuff
  16. Skin exit site directed lateral or downward
  17. Exit site should be **smallest skin hole** possible that allows passage of the catheter
  18. **No catheter anchoring sutures at the exit site** (use medical liquid adhesive and sterile adhesive strips to secure the catheter)
  19. Attach dialysis unit's requested catheter adapter and transfer set at time of procedure
  20. Exit site protected and catheter immobilized by non-occlusive dressing
- (OPTIMAL PD ACCESS: 2019 GUIDELINES, PDI 2019-VOL 39.NO.5)*

A scenic view from a window with a red text overlay. The window is open, showing a view of a coastal town, a blue bay with boats, and a clear blue sky with birds. The text is in a large, red, serif font.

**A lot of thanks,  
Your comments?**