

## Insertion of a peritoneal dialysis catheter under local anaesthetic percutaneous Seldinger technique (non-surgical)

Patients on the peritoneal dialysis (PD) pathway are referred by renal consultants to the Interventional Nephrologist or Medical Officer trained in the procedure for assessment. The patient must be assessed clinically and by ultrasound scanning (optional) to ascertain suitability for this procedure. There are three types of patients that may undergo this procedure:

1. [Patients requiring urgent dialysis \(please see post procedure management A\).](#)
2. [Patients not requiring urgent dialysis \(please see post procedure management B\).](#)
3. Patients for a **buried** PD catheter (please see post procedure management C).

Advantages of inserting peritoneal dialysis catheters (PDC) under Percutaneous Seldinger technique:

- Small incision site allowing early use of catheter
- Less risk of bleeding/leaks
- Done under local anaesthetic
- Early mobilisation
- Reduced hospital stay
- Operating theatre not required
- Can be performed by a physician

Disadvantages are:

- A 'blind technique' of insertion into peritoneal cavity.
- Not suitable if intra-abdominal adhesions are suspected.

Contraindications are:

- Obesity
- Caesarean section
- Appendectomy scar

(These patients can alternatively be done in theatre).

Complications are uncommon but the following should be assessed and addressed:

- Excessive bleeding from insertion or exit site.
- Heavily blood stained PD effluent.
- Infection at wound sites within 2 weeks.
- PD catheter migration.
- Bowel or solid organ perforation.

## **PRE-PROCEDURE MANAGEMENT**

Unstable patients are to have extra precautions as follows:

### **1. Diabetic patients on insulin:**

- Early light breakfast.
- Half dose of morning insulin.
- Check & note BSL. Notify renal team of result as patient may need intravenous (IV) Dextrose during procedure.

### **2. Patients on anti-coagulation:**

- Check clotting studies. Aim for therapeutic INR 1.5-2.0
- Reduce INR to a pre-operative level of 1.68 by:
  - Check INR – reduce standard warfarin dose by 50% for days 4, 3 and 2 before surgery.
  - Standard warfarin dose on day immediately before surgery.
  - Check INR on day of surgery.
  - The evening following surgery give 2X the standard dose of warfarin.
  - Then standard dose of warfarin thereafter.

### **3. Patients on anti-platelet medications:**

- High risk patients (coronary and other stents) are to continue their standard therapy.
- Low risk patients (primary prevention of CVA or IHD) are to stop aspirin or clopidogrel 5 days before procedure. If doubt exists, consult the patient's cardiologist/neurologist/nephrologists.

### **4. Hyperkalaemic patients:**

- Treat as per renal department policy.
- Haemodialysis may be considered.

### **5. Patients with fluid overload:**

- Patient may need loop diuretics.
- Haemodialysis may be considered.

**6. Uraemic patients or patients with high risk of bleeding:**

- Prophylactic measures should be considered in patients at high risk of bleeding and very uraemic patients<sup>(1,2,3)</sup>:

- **Desmopressin ( 1- deamino-8-D-Arginine Vasopressin (DDAVP))**

Dose is 0.3 ug/Kg IV (as per St. George Hospital's clinical policy) 30 minutes prior to surgery.

*Thought to increase factor VIII and minimize the impact of dysfunctional Von Willebrand Factor (vWF). Studies have demonstrated shortening and even normalization of bleeding time. Onset of action is rapid however bleeding times return to baseline at 24hrs and tachyphylaxis develops after single dose.*

- **Cryoprecipitate**

*Cryoprecipitate is rich in factor VIII, Fibrinogen and vWF. It is rarely used because of potential side effects and need for haematological approval.*

- **Conjugated Estrogens**

Conjugated estrogens (0.6 mg/Kg IV over 30 minutes daily for 5 days) improves bleeding times and clinical bleeding in both sexes. Maximal effect is at one week and duration up to 3 weeks. Low dose transdermal estrogen (50-100ug daily), and oral estrogens (50mg daily) are also effective.

- **Erythropoietin**

In addition to raising haematocrit to >30% which can take many weeks, recombinant EPO (40U/Kg x3 over 1 week) can improve the number of reticulated platelets and improve platelet function.

The patient should be admitted the **day before procedure for preparation**. Refer to preparation checklist below:

- Renal registrar to book procedure room with Cardiac Catheter Laboratory (CCL) NUM or 4South NUM (if CCL is not available).
- Notify relevant people of booked date/time i.e. Interventional Nephrologists, Nephrologists, PD nurses, Renal CNCs, ward nurses/team leader/educator.
- Inform renal team, PD nurses and Renal CNCs of patient's arrival on the ward.
- Pre-PDC insertion counselling and education on PD and PDC care by PD nurses.
- Consent: signed and explained;
- Pathology tests:
  - Serology must have been attended within the last 3 months
  - Full blood count
  - UECs
  - Clotting studies if indicated
  - MRSA swabs (positive patients for routine nasal mupirocin ointment)
- Routine checks and recording of vital signs i.e. pulse, blood pressure, temperature, respiratory rate, oxygen saturation and blood sugar level (for diabetic patients).
- In-dwelling urinary catheter insertion to ensure bladder is empty;
- Bowel management with the help of laxative and/or enema to decrease risk of bowel perforation and for ease of inserting PD catheter i.e. picoprep, bisacodyl enema and/or oral lactulose, bisacodyl tablets, coloxy with senna.
- Haemodialysis if necessary. Ensure patient is well haemodialysed if indicated.
- Antiseptic shower the night before the procedure.
- PD Catheter marking (mark with ink while patient is sitting, to avoid beltline and abdominal overhang in obese patients).

**On the day of the procedure**, refer to preparation checklist below:

- Fast 4 hours before procedure (in case patient may require surgical intervention)
- Antiseptic shower in the morning; patient must be in white hospital gown afterwards.
- Peripheral venous cannula insertion, avoiding forearm veins.
- Prophylactic antibiotics 2 hours before catheter insertion:
  - IV Cephazolin 1 gm or IV Vancomycin 1g (for MRSA patients)
  - IV Gentamicin 160 mg
- Routine checks and recording of vital signs i.e. pulse, blood pressure, temperature, respiratory rate, oxygen saturation and blood sugar level (for diabetic patients).
- Pre-operative checklist completed.
- Ward nurse escort to CCL.

**MINIMUM STAFF INVOLVED IN THE PROCEDURE**

1. Operator-fully gowned
2. Scrub Assistant-fully gowned
3. Scout Assistant-surgical hat and mask
4. Circulating Nurse-surgical hat and mask
5. Medical Officer for IV sedation (if used)-surgical hat and mask
6. Radiology Technician (if procedure done in CCL)

For bedside (ward) procedure, additional staff is required:

7. Registered/Enrolled Nurse to monitor patient's vital signs- surgical hat and mask
8. Registered/Enrolled Nurse-runner outside of the procedure room

**MATERIALS/EQUIPMENTS REQUIRED FOR PROCEDURE**

Materials available in Cardiac Catheter Laboratory (or to be provided by the ward for bedside procedure):

- |   |   |
|---|---|
| <input type="checkbox"/> Sterile gown x 3 (TP8 or TP10)     | <input type="checkbox"/> 10 x 10 ml normal saline polyampoule |
| <input type="checkbox"/> 2 x Large sterile drapes (TP2)     | <input type="checkbox"/> 3 x 21 g" needle                     |
| <input type="checkbox"/> Sterile gloves                     | <input type="checkbox"/> 2 x Trolleys                         |
| <input type="checkbox"/> Viraclean bottle                   | (1 for supplies and 1 for sterile field)                      |
| <input type="checkbox"/> 70% methylated spirit bottle       | <input type="checkbox"/> Betadine bottle                      |
| <input type="checkbox"/> 2x sterile gallipot                | <input type="checkbox"/> 30 sterile gauze swabs               |
| <input type="checkbox"/> 2 x Sterile Prep Sponges           | <input type="checkbox"/> Clinical waste bin                   |
| <input type="checkbox"/> 2 x sterile plastic drapes         | <input type="checkbox"/> Regular waste bin                    |
| <input type="checkbox"/> Contrast (if done in CCL)          | <input type="checkbox"/> Sharps bin                           |
| <input type="checkbox"/> 5 x 2% lignocaine (100 mg in 5 ml) | <input type="checkbox"/> Linen skip                           |
| <input type="checkbox"/> 2 x 10 ml syringes                 | <input type="checkbox"/> Sedations as ordered i.e. fentanyl   |
| <input type="checkbox"/> 2 x 20 ml syringe                  | and/or midazolam  |
| <input type="checkbox"/> 3 x drawing up needles             | <input type="checkbox"/> Sterile scissors                     |

Materials from PD unit:

- |   |   |
|---|---|
| <input type="checkbox"/> PD fluid warmer  | <input type="checkbox"/> Infusable Pressure Infusor   |
| <input type="checkbox"/> 2 x Warmed 1 Litre Normal saline   | <input type="checkbox"/> Heparin 5000 unit in 5 mls   |
| <input type="checkbox"/> 2 x Warmed 2 Litre CAPD PD fluid   | <input type="checkbox"/> 2 x Titanium connector       |
| <input type="checkbox"/> Manual IV giving set   | <input type="checkbox"/> 1 x Baxter PDC Extension set |
| <input type="checkbox"/> 1 x Quinton Curl Cath PD catheter Kit (57 or 62 cm-check size preference with interventional nephrologist) | <input type="checkbox"/> 2 x Baxter Minicap           |
| <input type="checkbox"/> Suture (Ethicon Prolene Blue)  | <input type="checkbox"/> 2 x Blue clamps              |
| <input type="checkbox"/> Cut down set   | <input type="checkbox"/> 1 x Excilon dressing         |
|   | <input type="checkbox"/> 8 x Tegaderm                 |
|   | <input type="checkbox"/> 2 x cutifilm (10 x 8)        |
|   | <input type="checkbox"/> 1 x Calcium Alginate (5 x 5) |

**PRE-MEDICATION AND AWAKE SEDATION**

1. Pre-meds:

- a. To be given 2 hours before the procedure: prophylactic **IV antibiotics** as ordered.
- b. To be given 1 hour before the procedure: **Metoclopramide** 10mg.

2. Awake intravenous sedation:

- a. To be administered by the nurse with the doctor's supervision 15-30 minutes before the procedure:
  - i. **IV Fentanyl (Sublimaze)** 50-100mcg. Dose adjustment is required based on creatinine clearance i.e. CrCl (eGFR) 10-50mls/min decrease 25%; CrCl <10mls/min decrease dose 50%
- b. To be administered by the nurse with the doctor's supervision in the procedure room just before the start of the procedure
  - i. **IV Fentanyl 50-100µg** - Should ensure patient is relaxed but able to participate and respond to communication /commands.
  - ii. And  $\pm$  **IV Midazolam (Dormicum)** 1mg every 2-3min. Maximum dose is 2.5mg. **Note:** Cumulative dose >5mg rarely needed; dose response varies with concomitant medications and clinical status. Dose adjustment is required based on creatinine clearance i.e. CrCl<10 mls/min, decrease dose by 50%. Administer over 2min and allow 2min to fully evaluate sedative effective.  
  
\*\*\* Do not administer rapidly especially when given in combination with IV Fentanyl.

**PROCEDURE**

1. Scrub then don gown, gloves and prepare patient
2. Infiltrate the  $\pm 20$ mls lignocaine 2-3cm below umbilicus and then along the subcutaneous tunnel 4-5cm in length to the exit site, checking it is on side opposite to their dominant hand. Ensure the peritoneal sheath is 'peppered' with lignocaine to ensure adequate anaesthetic.
3. Make horizontal skin puncture when numb.
4. Dissect 'bluntly' to peritoneal sheath (linea alba)
5. Insert needle attached to 10ml syringe with heparinised saline through the sheath. A syringe with  $\pm 10$ mls of heparinised saline should be injected during insertion of needle into the peritoneum, preventing perforation, and aiming it towards iliac fossa or behind bladder. An 18 gauge introducing needle with plastic outer sheath can also be used (not available in PDC pack), and the needle removed after insertion, this also to prevent bowel perforation.
6. Fill abdomen with about 500-1L of warmed Normal Saline. Saline should flow easily, and check to see that there is no subcutaneous collection, and that patient does not feel any bladder or bowel stimulation, suggesting bladder or bowel penetration. Patient may feel fluid entering peritoneum and may feel pain if larger volumes are used. If pain, lignocaine can be added to saline.
7. Advance guide wire, through needle or introducing sheath, directing it towards the iliac fossa/pouch of Douglas, removing the needle once guide wire is moving smoothly, without any obstruction or resistance, up and down. If there is any resistance then the technique should be abandoned. A loop of bowel filled with faeces or adhesions could account for the resistance or obstruction.
8. Thread the TROCAR and introducer over guide wire, withdrawing TROCAR slightly and allowing introducer to cover sharper end of TROCAR, once into peritoneum, to prevent bowel perforation
9. Ask patient to lift head off pillow to tense abdominal wall as advancing introducer and especially when passing TROCAR through peritoneal sheath. Patient can also cough to assist the sheath perforation.
10. Carefully introduce PDC peritoneal end of soft tube (with small holes) through outer (cylinder) trocar. It should move through easily without resistance, and sometimes dialysate/saline may escape through the catheter indicating correct positioning of catheter. Holding the tube peel back outer cylinder of the introducer. If available, x-ray screening can be carried out at this stage to ensure correct placement of catheter.



11. Using tunneling device pull the outer end of the soft Tenckhoff PDC through the tunnel, making a tight and secure exit wound/site (as small as possible, so as to prevent leaking). Sutures should not be required. Sutures increase likelihood of exit site infection.
12. Check PDC is draining well, and flush catheter with another 10-20mls of heparinised saline to prevent catheter blockage.
13. X-ray screening ( ± contrast) can be carried out to ensure catheter is working well and is correctly placed.
14. If working well then suture skin puncture, usually one or two sutures, and apply Kaltostat and Cutifilm dressings as required over sub-umbilical laceration and exit site. Immobilise PDC with tape.
15. Attach titanium connector and extension on PDC
16. Drain out more of the initial 500ml/1L of saline from the abdomen, then run in another 500mL/1L of dialysate. This dialysate should be heparinised (1000u/2L), and especially if dialysate is blood stained.
17. Cover PDC exit site with Excilon and Tegaderm dressing.
18. Patient should be sat up to 45<sup>0</sup>, as soon as possible, to ensure catheter moves downwards into iliac fossa or behind the bladder.
19. Heparin lock PDC once PD flush is completed and if no further PD flushes is required.

### **IMMEDIATELY POST PROCEDURE**

1. IV sedated patients are to be monitored for 15 minutes or more until stable enough for ward transfer.
2. Notify ward nurse to escort patient back to the ward.
3. Assisting PD nurse to give handover to ward nurse regarding patient's PDC care, flush/es and further PD plan.
4. Check and record vital signs i.e. pulse, blood pressure, temperature, respiratory rate and oxygen saturation every 15 minutes for first hour, then hourly for minimum of 4 hours or until stable.
5. Patient is allowed fluid and food after first hour if observations and symptoms are stable.
6. Nurse in bed to minimize movement and dislodgement of deep cuff. Encourage sitting up in bed to lessen likelihood of catheter migration.

7. Immobilise catheter with tape.
8. Monitor PDC exit site and midline wound for leaking or bleeding.
  - a. For excessive bleed/leaks, change dressing as necessary as per PD policy on [Exit Site Care - Post Op](#). Notify renal team and PD nurses.
9. For patients requiring further PD flush/es, monitor and record PD effluent quality.
  - a. For heavy blood stained PD effluent, notify renal team and PD nurses. Urgent blood tests and abdominal xray may be needed.
10. Monitor for increasing abdominal or PDC exit site pain. Administer analgesia as needed.
  - a. For unresolved abdominal or exit site pain, notify renal team and PD nurses. Urgent abdominal xray may be needed.
11. Monitor bowel movement. Give laxative as needed. Notify renal team if patient is constipated (no bowel motion for 2 days).
12. Advice/educate patient not to shower for 3 weeks as per PD policy on [Exit Site Care - Post Op](#).
13. Medical officer and PD nurse review prior to discharge

**A. POST PROCEDURE MANAGEMENT FOR PATIENTS REQUIRING URGENT PERITONEAL DIALYSIS**

Some patients may require peritoneal dialysis immediately after procedure for:

1. Urgent fluid removal for patient with fluid overload.
2. Urgent solute clearance for uraemic or hyperkalaemic patients.
3. Ongoing PD flushes to clear blood stained PD effluent and prevent PDC blockage.

**PD REGIMEN**

- Patient is to remain on the renal ward (4South) to start intermittent dialysis immediately: Break-in with small fill volume of one Litre for 24-48 hour intermittent peritoneal dialysis (IPD). Initial PD regimen to use is: Therapy: CCPD/IPD; Total Volume: 24000 mls; Fill Volume: 1000 mls; Last Fill: 0 ml; Therapy time: 24 hours.
  - Continue IPD until PD effluent clears or blood results improved.

- First week post-procedure: PD regimen is to be adjusted by PD nurse or renal team based on patient's clinical condition and biochemistry results.

#### EXIT SITE CARE

- Post-procedure exit site dressing is to remain intact for one week unless exit site is leaking or bleeding or advised otherwise by PD nurse/renal team. Thereafter, patient is to have weekly dressing change for 3 weeks (please refer to PD procedure: [Exit Site Care - Post Op](#)). **N.B.** May apply bactroban (mupirocin) ointment on exit site every dressing change until exit site is healed if ordered.
- Educate patient not to shower for 3 weeks as per PD procedure: [Exit Site Care - Post Op](#).
- Immobilise catheter with tape.
- If the exit site is leaking, the PD catheter must be rested for 24-48 hours. Thereafter catheter and patient can be re-challenged with the same small fill (1 Litre) volume using 24-48 hour intermittent peritoneal dialysis (IPD) program.  
**\*\*\*PD catheters not used >24 hours are to be heparin locked (5000u heparin in 20 mls Normal saline) as per PD policy.**
- If leaking on the exit site persists, patient is to have PD catheter rested for 2-3 weeks with weekly PD flushes, please refer to PD procedure: [PD catheter flush \(1 Litre\) or PD catheter flush \(Simple\)](#).  
**\*\*\*PD catheters not used >24 hours are to be heparin locked (5000u heparin in 20 mls Normal saline) as per PD policy.**
- If no (no further) leaks after 72 hours, titrate to higher fill volumes everyday, 500 ml at a time until 2 Litre fill volume is achieved.

#### PD CATHETER CARE/TROUBLESHOOTING

- Encourage patient to walk and sit upright in bed post insertion. Lying flat may result in catheter migration if patient's catheter is not settled in correct position.
- If bleeding or fibrin strands are present, please add 3000 U heparin to every 6 L dialysate bag until PD effluent is clear (please refer to PD procedure: [Heparin Administration for 6L bags](#) ).

- Ensure patient's bowel motion is regular (daily). Educate patient on importance of regular bowel motion. Give laxative or aperients as necessary e.g. lactulose, bisacodyl and/or coloxyl with senna.
- If poor inflow or outflow is noted, please refer to [Management of Poor Flow - No Flow Catheter](#) PD procedure.
- Sudden loss of PDC function warrants repeat abdominal x-ray to exclude catheter migration. If in an appropriate position (L iliac fossa or behind bladder – Pouch of Douglas), then patient may require Actilyse for 24 hours (please refer to PD procedure: [Actilyse: Use in Peritonitis and Blocked Catheter](#)) as fibrin strands or clotting in catheter can cause obstruction especially if bleeding has occurred post insertion or fibrin strands were noted.

#### FOLLOW-UP / PD TRAINING

- Once patient is stable, PD training may be started either as an inpatient or outpatient.
- Notify renal team and PD nurses prior to discharge to organise dialysis clinic appointment and follow-up.

### **B. POST PROCEDURE MANAGEMENT FOR PATIENTS NOT REQUIRING URGENT PERITONEAL DIALYSIS**

#### PD REGIMEN

- Patient is to stay on the renal ward (4South) for manual PD catheter flush until PD effluent is light pink or clear. PDC flushes are to be 1 Litre at a time. Once PD catheter flushing is done, the catheter is heparin locked to prevent blockages in the catheter (Please refer to PD procedure: [Flushes \(Weekly and Simple\)](#)).

#### EXIT SITE CARE

- Post-procedure exit site dressing is to remain intact for one week unless exit site is leaking or bleeding or advised otherwise by PD nurse. Thereafter, patient is to have weekly dressing change for 3 weeks (please refer to PD procedure: [Exit Site Care - Post Op](#)). **N.B.** May apply bactroban (mupirocin) ointment on exit site every dressing change as ordered until exit site is healed.
- Immobilise catheter with tape.

- Educate patient not to shower for 3 weeks as per PD procedure: [Exit Site Care - Post Op.](#)
- Monitor PDC exit site and midline wound for leakage or bleeding. Notify the renal team and PD nurses for any signs of leaks/bleed.

#### PD CATHETER CARE/TROUBLESHOOTING

- Encourage patient to walk and sit upright in bed post insertion. Lying flat may result in catheter migration if patient's catheter is not settled in correct position.
- Ensure patient's bowel motion is regular (daily). Educate patient on importance of regular bowel motion. Give laxative or aperients as necessary e.g. lactulose, bisacodyl and/or coloxyl with senna.
- If poor inflow or outflow is noted on PD flushes, please refer to [Management of Poor Flow - No Flow Catheter](#) PD procedure.

#### FOLLOW-UP / PD TRAINING

- Patient may be discharged the following day if stable and well enough.
- Notify renal team and PD nurses prior to discharge to organise dialysis clinic appointment and follow-up.
- Patient will be followed-up at the peritoneal dialysis unit weekly for PDC flush and dressing change as per PD procedure: [Flushes \(Weekly and Simple\)](#) and [Exit Site Care - Post Op.](#)
- PD training may begin in 2-3 weeks post procedure at the PD unit as usual.

### **C. POST PROCEDURE MANAGEMENT OF PATIENTS WITH A BURIED PD CATHETER**

#### WOUND CARE

- Abdominal suture site must be covered by Excilon and transparent semi-permeable dressing (eg. Tegaderm) post-op.
- Change dressing every three days unless advised otherwise by PD nurse or renal team.
- Advise patient to wear elastic bandage around their waist for 2-4 weeks (Prisch, 1997).

#### FOLLOW-UP

- Patient may be discharged on the same day of the procedure if stable and well enough.
- Notify renal team and PD nurses prior to discharge to organise dialysis clinic appointment and follow-up.
- Patient will be followed-up at the peritoneal dialysis unit as needed until exteriorisation of the PD catheter is required.

#### **REFERENCES**

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