Dramatic and symptomatic decline in renal function – Rapid start peritoneal dialysis ?

Kris Dailey (Author) Senior Nurse Educator / James Uy (Co Author) Registered Nurse / Kit Wong (Co Author) Registered Nurse
Royal Prince Alfred Hospital, 50 Missenden Road Camperdown 2050, New South Wales, Australia

Introduction:

This case is unique due to the extreme symptomology present prior to, during initiation and commencement of peritoneal dialysis and ongoing difficulties experienced in both nursing and medical management. Use of peritoneal dialysis (PD) as a rapid commencement therapy is not usually medically indicated in intensely catabolic or critically ill patients. Patients presenting emergently with refractory hyperkalaemia, acidosis, or pulmonary oedema are almost universally commenced on haemodialysis. A basic rapid start PD policy was in place however it was basic and did not incorporate management of the issues faced during the course of this patient presentation.

History and Presentation:

- 45 year old Caucasian female married with 2 children, working full time
- Medical history – Malignant hypertension, IgA Nephropathy
- Known to CKD clinic and Nephrologist at large metropolitan hospital
- Multiple presentations to GP, ED, CKD clinic for nausea and headache

Methods / Interventions:

Patient Positioning	Supine whilst cycler running / otherwise dry (or small last fill volume to address friction pain)
Exit Site Care	Visually checked every 2nd APD cycle for moisture strikethrough on dressing
Dressing	Surgical dressing changed post op then kept intact for 7 day stretches (21 days in total) No showers for 21 days

Past Interventions

Admission 1 (via ED) August 2018 (Referred by GP)

Hypertension, headache, nausea and vomiting

Poor oral intake, malnutrition, dehydration

eGFR 8, K - 6.5mmol/L, Hb 85g/L, creatinine 492µmol/L, urea 35.3mmol/L, ECG peaked T waves

Renal ultrasound, irbesartan ceased, urine ACR showed 3g protein loss, ↑ atenolol dosing

Commenced on ESA

Referred for insertion of PD catheter

Discharged with 1 week follow-up with nephrologist, CKD clinic, and PD unit

Initial Treatment

Admission 2 (via PACU) August 2018

Admitted for insertion of PD catheter

↓↓ urine output, eGFR 4, K - 6.0mmol/L, Hb 92g/L, creatinine 871µmol/L, urea 39mmol/L

Fluid overloaded and hypertensive on admission - not responsive to treatment

Further post-surgical deterioration as outlined in concerns

Concerns

Fluid status - inability to tolerate any oral intake / medications / dropping urine output

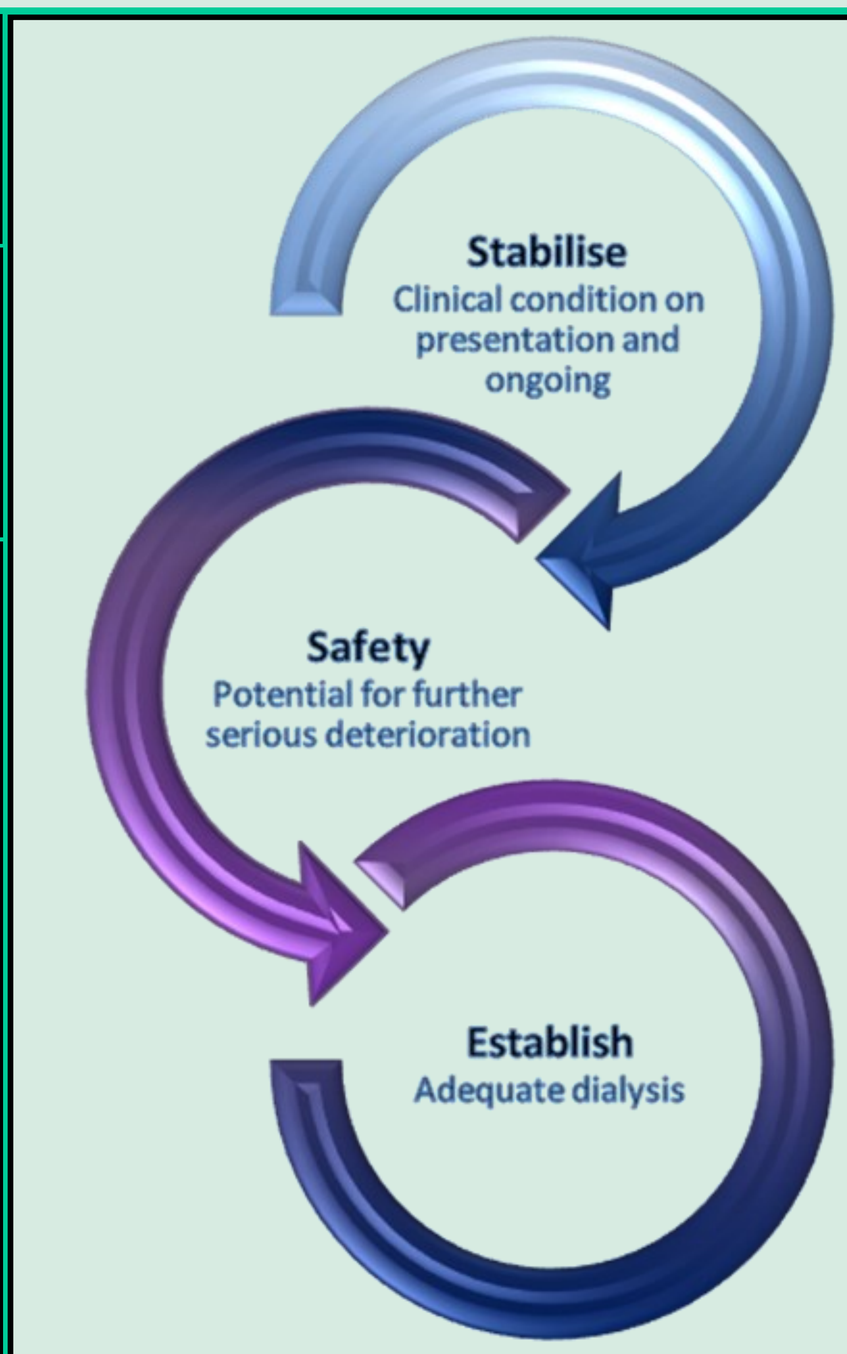
Neurological - Severity of headache, nausea and vomiting, and lack of response to treatment

Hypertensive crises - especially in light of neurological symptoms / nil intra-cranial pathology found

Metabolic acidosis - relative hyperkalaemia / pH 7.26 / BE -15mmol/L, HCO_3^- 11mmol/L

Acute renal insult on background of chronic kidney disease
Vs
Rapid progression of IgA Nephropathy ?

PERITONEAL DIALYSIS COMMENCED 36 HOURS POST CATHETER INSERTION



Complicated By:

- Significant serum potassium swing requiring twice daily measurement and potassium chloride additives to PD fluid
- 6 antihypertensive agents required to control blood pressure despite dialysis commencement
- Medication impact extremely variable due to ongoing nausea and vomiting
- Required palliative care input and use of multiple agents including subcutaneous cyclizine to control nausea
- Photophobia and blurred vision ongoing
- Ongoing malnutrition with variable BGLs
- No reversible precipitants for acute deterioration in renal function

Further Challenges:

- Serum nitrogenous waste resistant to removal in initial stages / Significant rise in liver function tests
- Establishing a medication regime appropriate for discharge and use during PD training
- Supine position requirement proved problematic due to extreme nausea and vomiting
- Difficulty with individualised care needs of patient within ward staff to patient ratio – required significant input from nurse educator re troubleshooting / decision making after hours

Short / Small / Stabilise

Day	Hours	Cycles	Gluc %	BP	Dwell Time	Cr / Ur	Fill Vol (mls)	Serum K (mmol/L)	Serum Bicarb	K Added to PD	Last Fill Volume	UF (mls)	Comments
1	7	5	2.5	208 /95	1 : 12	991 / 41.7	750	5.9	< 10 (BE –15)	0	0	-462	K 7.2 treated down prior to start
2	8.5	6	2.5	160 /70	1 : 07	1020 / 38.2	1000	4	14 (BE –11)	4mmol/L	0	-648	Dry friction pain
3	9.5	6	2.5	170 /105	1 : 31	1098 / 38.5	1000	3.7	18	4mmol/L	200	-529	
4	10.5	6	2.5	150 /90	1 : 40	1157 / 35.8	1000	3.7	20	4mmol/L	200	-520	
5	10.5	5	2.5	140 /70	1 : 53	1250 / 35.1	1000	4.1	24	4mmol/L	200	-287	
6	8	4	2.5	130 /65	1 : 30	1327 / 33.9	1000	4.6	27	0	200	+96	**Day of Discharge**

Results:

- **Stability and Safety**
  - Serum potassium (4.2 - 5.0mmol/L), systolic BP 125 -140, headache, photophobia and nausea significantly reduced
  - Metabolic acidosis resolved, tolerating oral intake, stable Hb g/L (105-115), streamlined medication regime
- **Establish** on PD **-** Ultrafiltration commenced, nitrogenous waste clearance, established catheter use, no catheter leakage
- Remained hospitalised until symptomatic improvement achieved / Pt discharged on day 8 post insertion of PD catheter

Strengths of Approach Used:

- Patient had opportunity to make treatment choice prior to significant uraemia therefore not a default option
- Patient remained committed to PD throughout despite difficult initiation phase
- No subsequent interventional procedures required
- Required integrated care between multiple specialties increasing team leadership and knowledge base
- Complication rate as per six main criteria in literature review (table below) considered extremely low

Limitations of Approach Used:

- Suboptimal clearance in initial phase of PD - No IHD prior to PD catheter insertion and commencement
- No clearly established suitability criteria – Guideline in place outlined positives rather than absolutes
- No established roles in place – No interventional nephrologist, no targeted surgeon at short notice, no PD case manager or access co-ordinator for inpatients
- Limited experience of rapid start PD procedures in nursing and medical staff group

Patient Outcome:

- Transferred to PD training unit for ongoing outpatient care
- Daily bloods with continuing stabilisation seen
- Daily nurse assisted treatment
  - Fill volume increased / glucose % decreased by day 14
  - Remained supine for first 4 days in training unit
  - Knowledge and procedures taught to husband (and patient as able)
- Catheter migration – self repositioned – no intervention or modality switch required
- Stable on home APD for 3 months
- Modality switch to deceased donor transplant 3 months post RRT start

Complications Regularly Seen in Rapid Start PD

Literature Reporting	Our Patient Case
Catheter Leaks	✗
Constipation	✗
Infection	✗
Catheter Migration	✓
Initiate PD in Hospital Environment	✓
Technique Survival	✓

Discussion Points:

- PD Prevalence - Australia 22.6% vs Czech Republic 8.2%
- Australia, despite reasonably high PD prevalence compared to OECD countries, does not offer a 'PD first' policy overall
- Individual units may have 'PD first' however this is generally found in rural / remote areas with limited access to IHD
- Annual health care expenditure vs costs to the individual are very dependent on PD infrastructure availability
- Pt featured in this case study may also have experienced suboptimal IHD due to risk mitigation strategies used to treat symptoms

Implications for Practice:

- Rapid start PD requires a specific nursing knowledge base in addition to that required for general PD practice
- Trust / rapport is imperative in this process and must be established as soon as possible after presentation
- Nursing based leadership at a senior level is required in the absence of established roles
- Policy / guideline needs to be expanded to include differential pathways and referral points for care especially in the context of medical deterioration and nursing troubleshooting for less experienced staff
- Staff to patient ratios must be altered to allow for appropriate monitoring, intervention, education and patient / family support to take place
- Further rapid start PD (if allowed for in policy) would require further PD staff support and surgical commitment
- Need to retrospectively look at outcomes of both late referrals and rapid deteriorations to ascertain type and number of patients who could have benefited from rapid start PD prior to establishing pathway
- Some advantages of extending access to rapid start PD to acute inpatients include an overall growth in PD patient numbers and avoidance of the difficulties associated with conversion of urgent start IHD patients to PD

Conclusion:

Rapid start PD is a safe and ultimately effective option that should be considered in patients who traditionally would otherwise have a suboptimal start to IHD. Pt commitment to overall outcomes must be evident from the outset as there are many contexts in the overall process of rapid start PD where care will fail if expectations of progress are not realistic. The successful transition of a rapid start PD patient to independent dialysis is highly dependent on the expertise and availability of PD trained nurses. The nursing role was fundamentally important in this case both in driving and making adjustments to care.