

Urgent-Start Peritoneal Dialysis Complications: Prevalence and Risk Factors

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Background: Mechanical complications are of particular concern in urgent-start peritoneal dialysis (PD) because of the shorter break-in period. However, risk factors have been reported inconsistently and data in urgent-start PD populations are limited.

Study Design: Observational cohort study.

Setting & Participants: All patients treated with urgent-start PD, defined as PD therapy initiated within 1 week after catheter insertion, January 2003 to May 2013.

Predictors: Age, sex, abdominal surgery history, body mass index, hemoglobin level, albumin level, C-reactive protein level, break-in period (period between catheter insertion and PD therapy initiation), dialysate exchange volume, and use of overnight dwell.

Outcomes: The presence of mechanical complications related to abdominal wall or catheter, including hernia, hydrothorax, hydrocele, subcutaneous leak, pericatheter leak, catheter malposition, omental wrap, and obstruction.

Results: 922 patients on urgent-start PD therapy were enrolled (mean age, 59.1 ± 15.0 [SD] years). Prevalences of abdominal wall and catheter complications were 4.8% and 9.5%, respectively. The most common abdominal wall complication was hernia (55%), followed by hydrothorax (25%). On adjustment, male sex (HR, 5.41; 95% CI, 2.15-13.59; $P < 0.001$) and history of abdominal surgery (HR, 2.34; 95% CI, 1.04-5.26; $P = 0.04$) were independently associated with higher risk for developing abdominal wall complications.

Limitations: As a cohort study, comparisons could not be established between urgent-start PD and conventional PD.

Conclusions: Urgent-start PD is a safe and practicable approach. Male sex and history of abdominal surgery could contribute to the development of abdominal wall complications.

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INDEX WORDS: Peritoneal dialysis (PD); urgent-start PD; abdominal wall complications; risk factor; hernia; hydrothorax; catheter complications; emergent dialysis; technique survival; break-in period; catheter obstruction; technique failure; end-stage renal disease (ESRD).

Although peritoneal dialysis (PD) is a cost-saving modality providing many benefits for patients with end-stage renal disease (ESRD), especially in terms of lifestyle flexibility and preservation of residual kidney function,^{1,2} most patients with uremia are treated with hemodialysis (HD) worldwide.³ The underutilization of PD is partly due to a generally low level of experience in initiating this treatment among patients with ESRD, especially those with more severe uremia symptoms and volume overload. Urgent-start PD, which usually refers to an approach that involves initiation of PD therapy earlier than 2 weeks after catheter insertion, has garnered increasing interest in the past decade.⁴ By allowing for expedited placement of a PD catheter and initiation of PD therapy within days, it may offer a cost-saving approach for patients requiring urgent dialysis.

Nevertheless, the nature of PD means that complications should not be neglected. Patients being treated with PD meet with an increased intra-abdominal pressure because of the dialysate volume infusing in the peritoneal cavity,⁵ which may result in anatomical complications of the abdominal wall.⁶

Practice- and patient-related factors might contribute to these complications. For instance, surgical technique, break-in period (the period between catheter insertion and PD therapy initiation), dialysate volume, previous abdominal surgery, multiple pregnancies, hernias, and obesity influence abdominal wall complications.⁷⁻¹¹ Although there have been successful efforts to reduce catheter-related infection, similar

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progress has been elusive for the problem of catheter dysfunction, which remains an important cause of technique failure.¹² A shorter break-in period has been associated with higher risk for catheter dysfunction, mostly because of malposition.^{13,14} These mechanical complications are deserving of special concern in urgent-start PD, given that patients usually have more severe uremia and thus initiate dialysis therapy after a shorter break-in period.

In China in recent decades, most patients with chronic kidney failure are referred late to dialysis, with low residual kidney function,¹⁵ and have thus been treated with urgent-start dialysis modalities. This situation provides a unique opportunity for investigating the occurrence of complications among patients on urgent-start PD therapy. We aimed to investigate the prevalence and risk factors of mechanical complications related to abdominal wall and catheter, respectively, among patients with urgent-start PD therapy from our center. The clinical practice of PD (ie, surgery, catheter, PD modality, and dosing strategy) is standardized in our unit; therefore, we focused mainly on patient-related risk factors for complications.

METHODS

Participants

All patients with urgent-start PD therapy, defined here as initiation of PD therapy within 7 days following catheter insertion, in January 2003 to May 2013 were enrolled. All participants were given lactate-buffered glucose dialysate with a twin-bag connection system (Baxter Healthcare). All patients received the manual dialysis modality. All patients visited a physician at least once every 3 months. The study protocol abided by the Declaration of Helsinki and was approved by the Institutional Review Board of Peking University First

Hospital [2011(357)]. Written informed consent was obtained from each patient.

Urgent-Start PD Practice

The algorithm of the urgent-start PD program is shown in Fig 1. Patients presenting with chronic kidney disease (CKD) stage 5 visiting our clinic were screened. If they needed dialysis, we would counsel them on the choice of dialysis modality. If the patient was willing to perform PD, the candidate patient was referred for inpatient PD catheter placement. PD catheters were usually placed within 1 to 2 weeks.

Peritoneal catheters were implanted using open surgery under local anesthesia by a nephrologist. The risk for a catheter leak was minimized by the insertion of a deep cuff in the paramedian position relative to the umbilicus and ensuring that the deep cuff was tunneled into the rectus muscle. The right side of the abdomen was usually selected for convenience because most patients are right handed. Only if there was concomitant hernia repair or history of multiple abdominal surgeries was the peritoneal catheter implanted laparoscopically. The type of catheter used was a straight double-cuff Tenckhoff catheter.

All patients enrolled in the study initiated PD therapy within 1 week; those with an acute indication (hyperkalemia, congestive heart failure, severe metabolic acidosis with bicarbonate levels < 15 mmol/L, or uremic encephalopathy) initiated PD therapy on the day of catheter placement (Fig 1). An infused volume of 0.5 to 0.8 L was used for the first 2 days, which was gradually titrated upward to 2 L within 1 month or so if the patients did not present with abdominal distension. Otherwise, the infused volume would remain at a tolerable level until patients could adapt to a higher volume and was gradually titrated to 2 L or the maximum tolerable volume.

Management of Abdominal Wall Complications

The flow chart for the management of abdominal wall complications is shown in Fig 2. Generally, patients were evaluated for whether dialysis therapy could be temporarily suspended. If not, they would be treated with adjusted PD regimens with a lower infusion volume in a proper position (supine position for hernia

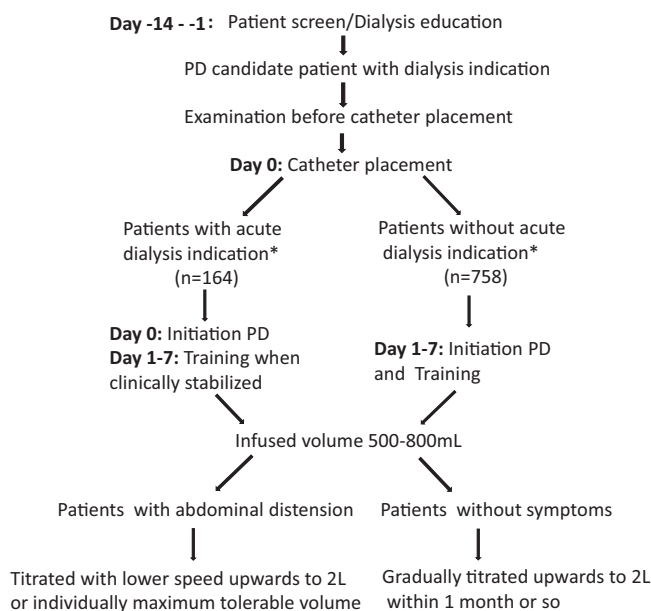


Figure 1. The algorithm of the urgent-start peritoneal dialysis (PD) program. *Acute dialysis indication, including hyperkalemia, congestive heart failure, severe metabolic acidosis with bicarbonate level, 15 mmol/L, and uremic encephalopathy. Abbreviations: HD, hemodialysis.

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