

## **Cloudy Peritoneal Dialysate in the Absence of Peritonitis**

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### **Abstract**

#### ***Presentation***

We present a case of a female patient on continuous ambulatory peritoneal dialysis who presented with cloudy effluent in the absence of peritonitis, presenting a diagnostic challenge.

#### ***Diagnosis***

Our patient developed cloudy effluent secondary to the use of a calcium channel blocker for control of hypertension.

#### ***Treatment***

Cloud effluent resolved on cessation of Lercandipine.

#### ***Conclusion***

Cloudy effluent is an important clinical finding in patients undergoing peritoneal dialysis and most commonly represents infection or peritonitis. However, there are some lesser known causes including certain drugs.

### **Introduction**

Continuous ambulatory peritoneal dialysis (CAPD) is an effective treatment modality for patients with end stage kidney disease<sup>1</sup>. Peritonitis is a serious complication of CAPD and is the most common cause of cloudy fluid. This is caused by polymorphonuclear leukocytes (PMNL) passing through the peritoneal fluid causing the effluent to appear cloudy. Patients with peritonitis usually present with abdominal pain, nausea, vomiting, fever and raised white cell count in the peritoneal fluid<sup>2</sup>.

There are rarer non-infectious causes of cloudy effluent in CAPD which include intraperitoneal malignancy, allergic reactions to PD solutions, increased fibrin, increased triglycerides, vasculitis and trauma<sup>3</sup>. Drugs are an often over-looked cause of cloudy effluent. Among the drugs causing cloudy effluent are amphotericin B, chloramphenicol, cefazolin, and dihydropyridine group of Calcium channel blockers<sup>4</sup>.

## **Case Report**

Our patient is a 60-year-old lady with end-stage kidney disease as a consequence of ANCA associated vasculitis who was newly commenced on peritoneal dialysis.

10 days later she presented to renal home therapies unit with cloudy effluent. Newspaper print was not visible through the fluid. She was asymptomatic and afebrile. A sample of peritoneal fluid was sent for white cell count and culture and returned a normal reading of  $14 \times 10^9/L$ .

The following day later she presented again with a second bag showing cloudy effluent. White cell count was  $42 \times 10^9/L$  on this occasion and she was commenced on vancomycin and ceftazidime and as per protocol. After two days there was no resolution in the appearance of the effluent. Antibiotics were stopped and a non-infectious cause was queried.

At the time her medications included aspirin 75mg OD, bisoprolol 2.5mg OD, omacor 1g OD, Orovite OD, calcium acetate 1g TDS, and lercanidipine 10mg OD. Following a literature review of non-infectious causes of cloudy effluent calcium channel blockers were reported as a rare cause. The patient's lercanidipine was stopped and replaced with doxazocin XL 4mg OD.

24 hours days after discontinuing lercanidipine, peritoneal effluent became translucent and continued to be so off lercanidipine.

## **Discussion**

Calcium channel blockers are routinely used in the management of hypertension and are a first line for patients over the age of 55. They are divided into different groups based on their molecular structure and are usually classified as dihydropyridines, such as lercanidipine, and non-dihydropyridines, such as verapamil.

Calcium channel blockers, especially dihydropyridines, have been known to cause cloudy peritoneal effluent. The first reported case in the literature was in 1993 and involved manidipine, with which the authors noted a cloudy dialysate in 5 out of 8 patients within 24 hours of commencing the drug, in the absence of clinical signs and symptoms of peritonitis and with negative cultures and normal white cell counts.

Triglycerides were noted to be elevated in the peritoneal effluent, which are not normally non-existent in dialysate. On discontinuation of the drug, the effluent became translucent and triglyceride levels returned to normal<sup>5</sup>.

A follow up study by the same authors identified three more drugs of this class (nifedipine, nisoldipine and benidipine) that induced a reversible cloudy dialysate<sup>6</sup>. Further studies have demonstrated similar results with lercanidipine<sup>7</sup>.

Although it's not fully understood, the literature currently proposes numerous mechanisms by which CCBs can cause cloudy effluent and triglyceride levels in the dialysis fluid are thought to play a principal role. The CCBs that are known to cause cloudy effluent more frequently are mostly lipophilic. This lipophilic nature of certain CCBs and their effect on the GI tract, lymphatic vessels and blood vessels is believed to influence triglyceride levels in effluent, leading to cloudy dialysate.

Studies have found that those with cloudy effluent on lercanidipine have higher peritoneal membrane transport, leading to greater accumulation of lercanidipine in effluent and thus resulting in decreased lymphatic absorption, further increasing effluent triglyceride levels<sup>8</sup>. Serum triglycerides and dialysate triglycerides were not measured in our patient.

Further studies of CCB's mechanism of action report that their action on lymphatic vessels leads to reduced contractility of the vessels, which contributes to increased hydrostatic pressure in such vessels and vasodilation, ultimately leading to increased exudation of lymph. Our patient had no evidence of peripheral oedema.

Healthcare professionals caring for patients on peritoneal dialysis should be aware of drugs that can cause cloudy effluent in the absence of peritonitis or positive cultures. This will help avoid unnecessary antibiotic therapy and costs.

**Declaration of Conflicts of Interest:**

The authors have no conflicts of interest to declare.

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