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Case report

Laparoscopic Cholecystectomy In A Patient With End Stage Renal Disease Undergoing Continuous Peritoneal Dialysis – A Case Report

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Abstract

Introduction. Peritoneal dialysis (PD) is a treatment of choice in end stage renal disease (ESRD) patients, especially those with vascular access problems. However, occasionally, these patients' condition may be complicated by cholecystopathy, including either cholelithiasis and/ or cholecystitis. Importantly, surgical interventions for a disease that disturb the integrity of abdominal cavity boundaries can disrupt the regular PD schedule.

Case report. 19-year-old white female, presented at University Clinic of Nephrology with dyspepsia, vomiting, and intermittent right upper quadrant abdominal pain, present for couple of weeks. She was with ESRD on maintenance peritoneal dialysis program since 2017. The history of a recurrent right upper quadrant abdominal pain with the laboratory data at the hospital admission, suggested that a gastroenterohepatologist should be contacted for ultrasonography examination of the abdomen. The evidence of a gall-bladder mass, indicated the need for cholecystectomy. Abdominal surgeon was contacted, and cholecystectomy was scheduled. The patient underwent laparoscopic cholecystectomy (LC). The peritoneal catheter was still placed in the peritoneal cavity regardless of the surgical procedure. No complications during surgery were reported. Post - operative course was also uneventful.

Conclusions. Recent reports suggest that it is possible to successfully and safely perform laparoscopic procedures in patients on PD without removing the PD catheter and with a relatively short period of HD in the interim period before resuming PD.

Keywords: laparoscopic cholecystectomy, peritoneal dialysis, PD catheter

Introduction

Peritoneal dialysis is a treatment of choice in ESRD patients, especially those with vascular access problems. PD offers a therapeutic approach that is rational for managing end-stage renal disease in the broader context of overall health care. It is associated with reduced stress on the cardiovascular system, better preservation of the residual renal function and minimal variation in the intravascular volume status [1-3]. However, occasionally, these patients' condition may be complicated by cholecystopathy, including either cholelithiasis and/or cholecystitis [4,5] Importantly, surgical interventions for a disease that disturb the integrity of abdominal cavity boundaries can disrupt the regular PD schedule, and in certain instances, interim hemodialysis (HD) or even permanent transfer to HD might be indicated [6-11]. Since 1987, laparoscopic cholecystectomy has become an established procedure for treatment of cholelithiasis [12-14]. However, there is no consensus on the use of LC in patients receiving chronic ambulatory PD (CAPD) [7]. In addition, there are no clear recommendations in the literature regarding the continuation or interruption of CAPD in the perioperative period among this patient population for laparoscopic procedures [7]. Before the introduction of laparoscopic techniques, surgical interventions often required interruption of CAPD with temporary hemodialysis allowing surgical repair and return of the peritoneal integrity before CAPD could be resumed [7]. The traditional practice after laparoscopic surgery has been to delay reinitiating of CAPD for a minimum of 6 weeks because of the belief that increased intra-abdominal pressure might stress the peritoneum and abdominal wall at the surgical sites, that may result in peritoneal rupture and fluid leakage during CAPD [15]. Additionally, there is a potential for wound dehiscence, abdominal hernia, inferior ultrafiltration due

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to the peritoneal edema or dialysate leakage, postoperative sepsis, peritonitis, hemoperitoneum due to impaired host defenses, uremic coagulopathy, and protein depletion.

Case report

19-year-old white female, presented at University Clinic of Nephrology in December 2019, with dyspepsia, vomiting, and intermittent right upper quadrant abdominal pain, present for couple of weeks. As for her previous conditions, she has had multiple comorbidities as an atrial septal defect that has been repaired surgically in the childhood, hormonally inactive tumor on the left adrenal gland (detected and diagnosed in 2018), and a chronic kidney disease since 2017 (etiology not confirmed). She has been on maintenance PD since September 2019 with one episode of peritonitis, two months before the actual admission at our Clinic. The patient was on bagless CAPD with a y-set drainage system, four 2-L exchanges/day. The physical examination on admission revealed a blood pressure of 140/ 89 mmHg, a temperature of 37 C, and a heart rate of 92/min. The lungs were clear. Abdominal examination revealed a Tenckhof catheter in place with a healthy-looking exit site, free from abdominal tenderness. Neurologic examination was not remarkable.

At admission, laboratory data revealed normal electrolyte levels, with serum creatinine and blood urea nitrogen (BUN) values of 1051 μmol/l and 12.5 mmol/l, respectively. Other laboratory test results, showed in Table 1, were gamma-glutamyl transferase 182 U/L (normal range 9-64 U/L), alkaline phosphatase 273 U/L (normal range 36-126 U/L), aspartate aminotransferase 271 U/L (normal range 10-34 U/L), alanine transaminase 208 U/L (normal range 10-45), white blood cells 9.7, hemoglobin 120 g/l. The peritoneal lavate, showed no signs of infection and inflammation.

Table 1. Laboratory data of the patient from admission till discharge

10 Dec 2019		**16 Dec 2019**		**23 Dec 2019**	
Hemoglobin	120 g/l	Hemoglobin	123 g/l	Hemoglobin	96 g/l
WBC	9.7 x 10^9 L	WBC	6.8 x 10^9 L	WBC	4.9 x 10^9 L
sCreatinine	1051 μmol/l	sCreatinine	1054 μmol/l	sCreatinine	959 μmol/l
sUrea	12.5 mmol	sUrea	15.5 mmol/l	sUrea	9.1 mmol/l
GGT	182 U/L	GGT	106 U/L	GGT	92 U/L
ALP	273 U/L	ALP	162 U/L	ALP	113 U/L
AST	271 U/L	AST	26 U/L	AST	29 U/L
ALT	208 U/L	ALT	80 U/L	ALT	39 U/L

Abbreviations: WBC: white blood cells; GGT: gamma glutamyl transferase, ALP: alkaline phosphatese, AST: aspartate aminotransferase, ALT: alanine transaminase

The history of recurrent right upper quadrant abdominal pain and the laboratory data from the admission, required gastroenterohepatology department consultation for an ultrasonography examination of the abdomen. The evidence of a gall-bladder mass, indicated the need for cholecystectomy. Abdominal surgeon has confirmed the need of a cholecystectomy that was scheduled in the following days. Two days before surgery, CAPD was done with four 1-L exchanges of dialysate. At the day before cholecystectomy, considering that the patient is also listed for a living donor kidney transplantation in a month, she was transferred from PD to hemodialysis. Femoral central venous catheter was inserted and hemodialysis performed prior to the surgery. The peritoneal catheter remained inserted in the peritoneal cavity during the surgical procedure.

The patient underwent laparoscopic cholecystectomy. A 10mm trocar was placed in the right side of the epigastrium, a 5mm trocar in the right side in the midaxillary line, a 5mm trocar in the anterior axillary line, and a 10mm trocar was introduced through an infraumbilical incision. The infraumbulical port was used to introduce the laparoscope. The PD catheter was clearly seen lying in the pelvis. Minimal intraabdominal adhesions and a few adhesions near the gall bladder have been observed. No complications during surgery were reported. Post - operative course was also uneventful. She was treated with usual antibiotics and other supportive therapy.

Discussion

Acute cholecystitis is commonly associated with inflammation caused by prolonged obstruction of the cystic duct with gallstones [16]. Even though gallstones are the most important factor in the pathogenesis of acute cholecystitis, on the other hand, many other investigated factors for developing gallstones have been considered [17,18]. Despite many studies have investigated the relationship between gallstones and ESRD, it remains to be clarified whether gallstones are more common in patients with ESRD [15-17]. Some studies report that the gallstones incidence in patients on hemodialysis was not different from that in controls [19-24], while others have reported a higher incidence

of gallstones in patients on hemodialysis compared to the control group [25-30].

Hypoperfusion in organs happen in patients on hemodialysis because of the fluctuations in the hemodynamics. The result of that is frequent mesenteric ischemia. Furthermore, the mesenteric ischemia can make disruption of the gut mucosal structure, leading to chronic malnutrition with, of course, a higher incidence of peptic ulcer disease. Hence, a higher incidence of peptic ulcer disease is seen in dialysis patients with poor nutrition [31]. The same situation might occur in the gallbladder. Additionally, system inflammation can happen to these patients due to increased circulating levels of uremic toxin. Moreover, increased leukocyte margination and focal lymphatic dilation with interstitial edema are associated with local microvascular occlusion [32-34]. In peritoneal dialysis patients, acute cholecystitis is stimulated to happen by chronic active inflammation of the peritoneum. Endotoxemia as well. [35,36]. The hypothesis remains that chronic inflammation of the gallbladder and decreased gallbladder motility due to uremia, are main causes of the increased incidence of cholecystitis.

When it comes to managing acute cholecystitis, laparoscopic cholecystectomy is recommended as a first-line treatment in the general population [37]. However, following the outcomes of patients with ERDS undergoing cholecystectomy by looking at previous studies on that matter, the conclusion was that ESRD is an independent risk factor for postoperative morbidity [38,39]. Although patients on dialysis are at risk of postoperative complications, laparoscopic cholecystectomy is recommended as a first-line treatment for acute cholecystitis even in patients undergoing peritoneal dialysis [7,40-42].

Ekici *et al*. [43] conducted a study where laparoscopic cholecystectomy was performed in patients with end-stage renal disease treated with continuous ambulatory peritoneal dialysis. The comparison was between 11 patients receiving peritoneal dialysis treatment, and 33 patients without end-stage renal disease who had undergone an elective laparoscopic cholecystectomy. All their medical records and laboratory values were reviewed, as well as the outcomes and results. Their peritoneal dialysis group showed a higher frequency of associated disease and previous abdominal surgery, a lower platelet and hemoglobin count and elevated alkaline phosphatase, creatinine values and blood urea nitrogen. One procedure in each group was converted to an open cholecystectomy. No other catheter-related complications were noted that occurred. Laparoscopic cholecystectomy may be performed with low complication rates in patients undergoing continuous ambulatory peritoneal dialysis with an experienced team, was the conclusion from the authors.

When it comes to the management of asymptomatic gallstone disease among the ESRD patients, there is no consensus and no evidence was found for increased morbidity or mortality related to gallbladder disease. Cholecystectomy is indicated only in symptomatic cholelithiasis patients with ESRD, as in the general population.

Homogeneous to the case report we are presenting, Attard *et al*. [44] conducted a study about laparoscopic procedures in patient undergoing peritoneal dialysis without removal of the PD catheter. The thing that was different from our case, was that a 61-year-old male had undergone elective right hemicolectomy. For 4 years he had been doing well on ambulatory peritoneal dialysis. When routine hemoglobin assay was done, initially normal, the suggestion was development of iron deficiency anemia. Therefore, he was referred for colonoscopy. This showed the presence of a caecal carcinoma. When Staging CT was done, it did not reveal any spread. The next step was that he was established on hemodialysis via a temporary venous line, and furthermore, he underwent laparoscopic right hemicolectomy through 4 ports. Pneumoperitoneum was established via the PD catheter which was left in situ.

Conclusion

The suggestion from recent reports is that it is possible to successfully and safely perform laparoscopic procedures in patients on PD without removing the PD catheter, and with a relatively short period of HD in the interim period before resuming PD. Laparoscopic cholecystectomy [45], laparoscopic radical nephrectomy [46], and laparoscopic appendicectomy for perforated appendicitis [47] have been reported using this approach. In our case, laparoscopic cholecystectomy was done without removing the PD catheter without any complications for the patient. Furthermore, renal transplantation was successfully performed in February 2020.

Conflict of interest statement. None declared.

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