

# Laparoscopic Placement and Revision of Peritoneal Dialysis Catheters

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## ABSTRACT

Chronic peritoneal dialysis is an option for many patients with end stage renal disease. Laparoscopy offers an alternative approach in the management of dialysis patients. Over an 18-month period, laparoscopy was used for placement or revision of seven peritoneal dialysis catheters. All were placed in patients with end stage renal disease for chronic dialysis. Two catheters were initially placed using the laparoscope, and in five other patients, the position of the catheter was revised. Of the two patients who had their catheters placed initially, one patient had a previous lower mid-line incision and underwent laparoscopic placement of a catheter and lysis of pelvic adhesions. The second patient had hepatitis C and chronically elevated liver function tests. He underwent laparoscopic placement of a peritoneal dialysis catheter and liver biopsy. Five patients had laparoscopic revision for non-functional catheters. Four were found to have omental adhesions surrounding the catheter. Three patients were found to have a fibrin clot within the catheter, and in one patient the small bowel was adhered to the catheter. All seven patients had general endotracheal anesthesia. There were no operative or anesthetic complications. The average operative time was 56 minutes. Four patients had their procedure in an ambulatory setting and were discharged home the same day. One patient was admitted for 23-hour observation, and two patients had their procedure while in the hospital for other reasons. In follow-up, there was one early failure at two weeks, which required removal of the catheter for infection. One catheter was removed at the time of a combined kidney/pancreas transplant eight months after revision. The other five catheters are still functional with an average follow-up of ten months. These results suggest that laparoscopy is another method for placement of peritoneal dialysis catheters and more importantly for revision

in patients with nonfunctional catheters secondary to adhesions. It also provides an opportunity to evaluate the abdomen and perform concomitant procedures.

**Key Words:** Laparoscopy, Dialysis catheter, Renal Disease.

## INTRODUCTION

There are currently over 200,000 patients on some form of dialysis in the United States, and the number continues to grow at a significant rate.<sup>1,2</sup> Since the introduction of a chronic indwelling catheter in 1976, peritoneal dialysis has been a viable option for patients with end stage renal disease.<sup>3</sup> Continuous Ambulatory Peritoneal Dialysis (CAPD) is increasing in popularity as an alternative to hemodialysis for several reasons. CAPD has many advantages over hemodialysis including cost, simplicity, patient independence and improved nutrition.<sup>4</sup> The use of peritoneal dialysis catheters also has some disadvantages, most of which are related to complications with the catheter. Peritonitis, catheter infection, and mechanical malfunction are the most common complications.<sup>3</sup> Catheter malfunction is usually secondary to migration of the catheter out of the pelvis or occlusion of the catheter by the omentum or adhesions.

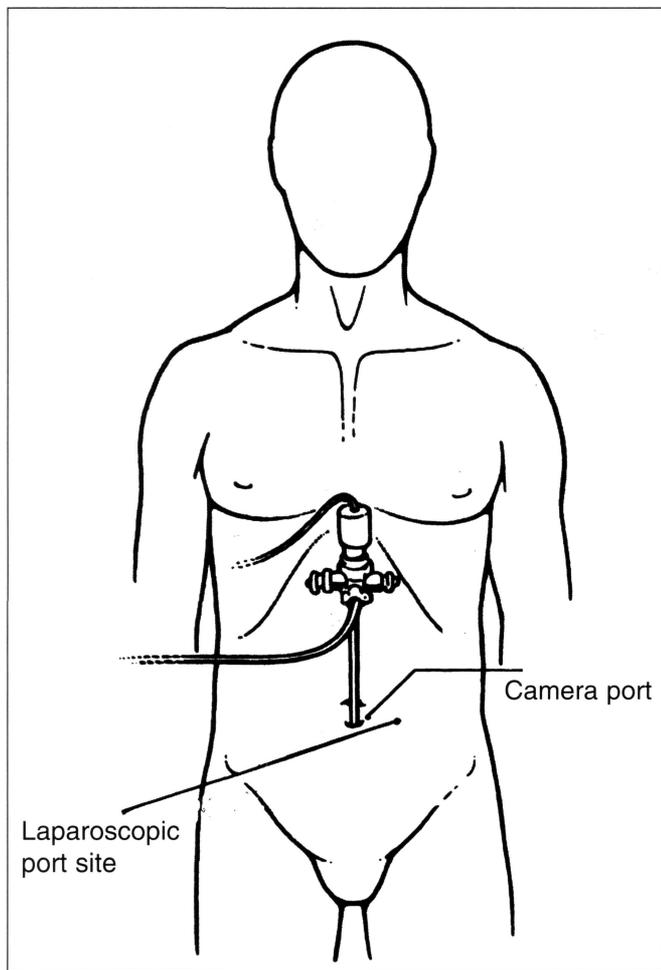
In the past, several different techniques have been used to salvage malfunctioning catheters. Open revision and fluoroscopic-guided manipulation were the most often used techniques until the late 1980's when the use of the laparoscope became more popular.<sup>5</sup> In our series, we found that laparoscopy offers an alternative approach for revision of these catheters and for primary placement of peritoneal dialysis catheters in patients with previous abdominal surgery.

## MATERIALS AND METHODS

We performed a retrospective review of seven patients who, over an 18-month period, underwent placement or revision of a peritoneal dialysis catheter using laparoscopy. All patients had end-stage renal disease. In five patients, diabetes was the cause of their kidney failure; one was secondary to reflux nephropathy and one

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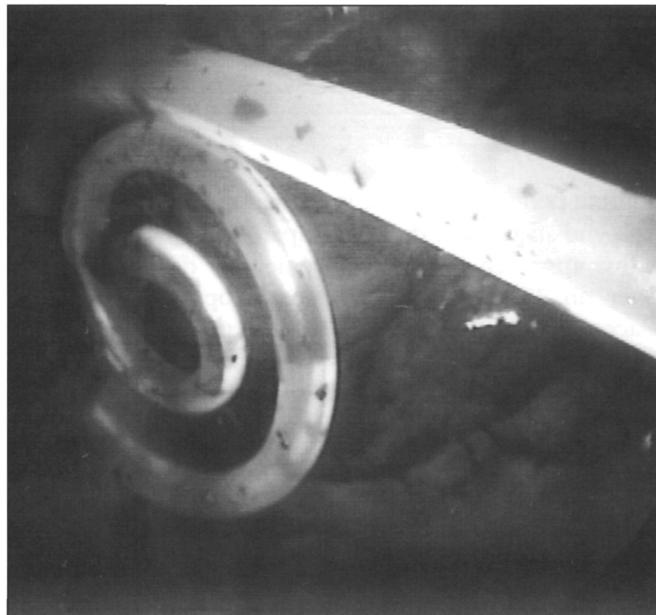
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**Figure 1.** Laparoscope placement and revision of peritoneal dialysis catheters.

was due to nephrotic syndrome.

All patients had general endotracheal anesthesia. A Hasson trocar was placed in the infra-umbilical position using an open technique in all patients. A pneumoperitoneum was then obtained, and the laparoscope was introduced. In the two patients who underwent primary placement of the catheters, a 5 mm trocar was placed to the left of the umbilicus under direct vision (**Figure 1**). With a camera through the periumbilical port and a blunt instrument through the second port, the abdomen was explored and any adhesions were lysed. A single-cuffed catheter was then placed into the abdomen through the 5 mm port and the distal end was then centered in the pelvis (**Figure 2**). The 5 mm port was then removed,



**Figure 2.** Laparoscope placement and revision of peritoneal dialysis catheters.

bringing the proximal end of the catheter out the 5 mm cannula site and leaving the cuff within the rectus sheath. One of the patients who had the catheter placed primarily had chronically elevated liver function tests and also underwent a percutaneous liver biopsy.

In the five patients who underwent revision of malfunctioning catheters, the umbilical trocar was placed using the technique described above. One or two other 5 mm trocars were also placed to allow for catheter manipulation and lysis of adhesions. Four patients were found to have omental adhesions surrounding the catheter (**Figure 3**). Three patients were found to have fibrin clot within the catheter, and in one patient the small bowel was adhered to the catheter. Infusing and draining dialysis fluid prior to closing tested all catheters. The fascia at the umbilical port site was closed, and the skin was closed with subcuticular sutures.

## RESULTS

All procedures were completed laparoscopically, none required conversion to an open procedure. In follow-up, there was one early complication at two weeks, which required removal of the catheter for an exit-site infection. This catheter was still functional despite the

infection. A second catheter remained functional but was removed eight months later at the time of a combined kidney-pancreas transplant. The remaining five catheters are still functional with an average follow-up of ten months. All patients underwent successful peritoneal dialysis in the immediate postoperative period without evidence of leak or other postoperative complications.

## DISCUSSION

There continues to be an ever-increasing number of patients requiring treatment for end-stage renal disease. At present, approximately 15–20% of these patients are maintained on peritoneal dialysis.<sup>3</sup> The number of new patients who are beginning this form of treatment, either by choice or that of their primary physician, is only expected to increase. The laparoscopic approach to these patients offers several advantages. It provides a good view of the peritoneal cavity and allows the surgeon to directly visualize the cause of the malfunction. It allows for laparoscopic manipulation of catheter position, removal of fibrin plugs, and creates minimal bleeding which postoperatively can cause the catheter to plug with blood and fibrin products. In addition to these advantages, the fact that the laparoscopic ports can be quickly and securely closed insures the rapid reinstatement of peritoneal dialysis rather than interim hemodialysis requiring a temporary catheter. There is also the ben-

efit of the initial laparoscopic placement of peritoneal dialysis catheters in patients who have had prior abdominal surgery. In this setting, laparoscopic lysis of adhesions can be performed and can allow for peritoneal dialysis in patients who would otherwise require hemodialysis.

Failure of this technique is mainly associated with catheters that have recurrent infections and have been encased by massive adhesive process secondary to infection. We feel after one attempt at laparoscopic revision, these patients should be avoided and another technique used.

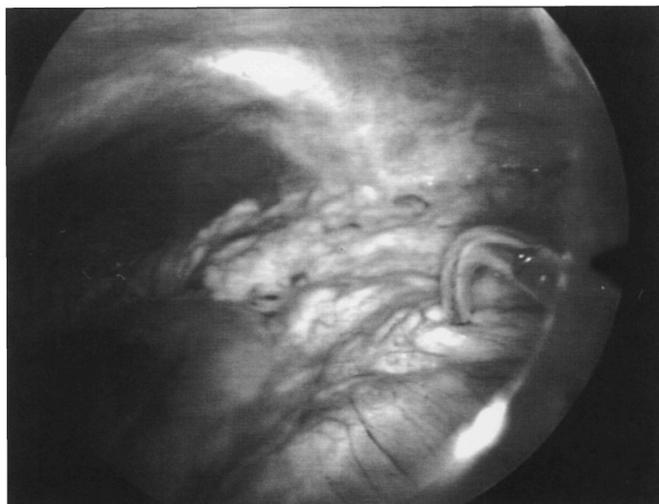
We have found in a small series of patients that laparoscopy offers an alternative approach in the management of patients requiring peritoneal dialysis.

## ADDENDUM

Since the submission of this paper, there are six other patients who have undergone laparoscopic revision of their peritoneal dialysis catheter. The six patients were all found to have revisable problems at the time of their laparoscopic procedure. Five of these patients had omental adhesions, and one of the patients had encasement of the peritoneal dialysis catheter with bowel.

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**Figure 3.** Laparoscope placement and revision of peritoneal dialysis catheters.