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Technical Report

How can videolaparoscopy be used in a peritoneal dialysis programme?

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Abstract

Background. Recently videolaparoscopy is considered to have a vaster use in surgery due to the undeniable benefits such as low operatory traumatism, quick recovery of canalization, a short stay in the hospital and minor scarring.

Methods. Forty patients were treated with peritoneal dialysis (PD); 15 videolaparoscopic procedures were performed on 13 patients before starting PD and two during the course of PD. The videolaparoscopy procedure was started by inducing pneumoperitoneum after initiation of general anaesthesia through endotracheal intubation.

Results. Peritoneal catheter placement was carried out in 11 ESRD patients showing abdominal scars due to previous laparotomies; their abdominal condition precluded safe PC placement using conventional non-laparoscopic procedures with local anaesthesia. Release of adhesions was performed only in two patients. Videolaparoscopy was also used in three patients for elective cholecystectomy; 2/3 underwent concomitant PC insertion. One patient was submitted to cholecystectomy during the course of CAPD; following the procedure we left the peritoneum dry overnight and then we started temporary IPD, using small volumes, avoiding haemodialysis (HD). Regular CAPD was resumed 6 days later. Finally, videolaparoscopy was also used for diagnostic purpose i.e. in one 59-year-old man patient who had a peritoneal catheter obstruction. Repeated rescue attempts using urokinase solution to irrigate the peritoneal catheter had been used in vain attempts prior to the procedure.

Conclusions. Videolaparoscopy proves to be a useful tool in a PD programme. Firstly, it may be used as a technique for catheter implantation, not as a routine procedure but in patients with extensive abdominal scars due to previous laparotomy, i.e. at risk for accidental viscera perforation due to the possibility of adhesions between intestinal loops and parietal peritoneum. Secondly, videolaparoscopy used for abdominal surgery allows the resumption of PD immediately after surgical procedure and thus avoiding HD. Videolaparoscopy is fundamental for diagnosis and rescue of catheter dysfunction and has an integral role in the successful management of these patients in extending catheter function and permitting safe replacement of peritoneal catheter if it becomes necessary. Along with the undeniable advantages, remains the disadvantages that it must be carried out by an expert surgeon in an operating theatre while the patient is under general anaesthesia.

Key words: cholecystectomy; peritoneal catheter; peritoneal dialysis; videolaparoscopy

Introduction

Videolaparoscopy was used for the first time in gynaecology 25 years ago, but it has only recently been applied to gastro-intestinal surgery. Now videolaparoscopy is the most common procedure for cholecystectomy and has found an even greater purpose in thoracic, abdominal and pelvic surgery. It has the undeniable benefits of low invasiveness, low incidence of ventilatory disorders, quick recovery of canalization, a short stay in the hospital and minor scarring.

Subjects and methods

Between July 1994 and January 1998, 40 patients were treated with peritoneal dialysis (PD); 15 videolaparoscopic procedures were performed on 13 patients before starting PD and two during the course of PD.

The videolaparoscopy procedure was started by inducing pneumoperitoneum after initiation of general anaesthesia through endotracheal intubation [1]. CO_2 gas was insufflated into the peritoneal cavity through a Verres needle introduced into the left subcostal area or through a peritoneal catheter if already in place; CO_2 was maintained at a pressure of 13 mmHg. A 10 mm trocar port was then inserted at the midline, 4 cm cephalad or caudad to the umbilicus and far away from any previous laparotomy scars, for the introduction of the laparoscope connected to the camera. Then, placing patients in a Trendelenburg position, we easily surveyed the abdominal cavity. Placement of the other 5 mm trocars depended on the nature of the surgical procedure.

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Results

Patients receiving videolaparoscopy in our PD-programme are listed in Table 1. We performed videolaparoscopy for peritoneal catheter insertion in 11 ESRD patients with abdominal scars due to previous laparotomies (hysterectomy, 4; appendectomy, 3; cholecystectomy, 3; and laparoscopic exploration for abdominal trauma resulting in nephrectomy, 1). Two out of eleven patients also underwent elective videolaparoscopy–cholecystectomy in preparation for renal transplantation because the condition of the abdomen precluded safe peritoneal catheter placement using conventional non-laparoscopic procedures with local anaesthesia. Release of adhesions was performed with dissecting forceps or electric cautery in two patients.

Videolaparoscopy was also used in three patients for elective cholecystectomy; two of which underwent concomitant peritoneal catheter insertion. Cholecystectomy was performed in one patient during the course of CAPD. Following the procedure we left the peritoneum dry overnight and then started temporary IPD using small volumes (1 l gradually increasing to 1.5 or 2 l volumes), avoiding haemodialysis (HD). Regular CAPD was resumed 6 days later.

The operating room time was about 30 min for peritoneal catheter implantation and 60–70 min for cholecystectomy. Eight hours later the patients had a liquid meal and were able to get out of bed. The break-in period was 2 weeks for peritoneal catheter insertion alone, and 3 weeks when peritoneal catheter insertion was performed with cholecystectomy in accordance with the surgeon's recommendation. No dialysate leakage occurred. Clinical and laboratory indices revealed adequate PD indicating that the peritoneal catheter was functioning well. All the patients had a blood-tinged effluent dialysate; only one of which required a blood transfusion due to tearing of an arteriole in the course of cholecystectomy.

Videolaparoscopy was also used for diagnostic purpose in one 59-year-old male patient. He had an appendectomy 41 years before and a peritoneal catheter implantation for ESRD, performed using a traditional surgical technique, 2 years prior to coming to our unit. During these 2 years, this patient had two CAPD-associated episodes of peritonitis and many peritoneal catheter translocations. On arrival in our unit, he has peritoneal catheter inflow and outflow obstruction. Abdominal radiographs revealed a curled, well-positioned peritoneal catheter and no distension of the intestine. Repeated rescue attempts prior to the videolaparoscopy procedure using a urokinase solution to irrigate the peritoneal catheter were in vain. The videolaparoscopy showed the presence of multiple and extensive adhesions between intestinal loops, between loops and parietal peritoneum and between loops and the greater omentum. The adhesions affected more than 50% of the peritoneal surface area, and formed closed sacs in which we found sequestrated dialytic solution. Such an anatomical situation is the only absolute contraindication for chronic PD [2].

Table 1. Use of Videolaparoscopy in our PD programme

Patients	Sex/age	Indication for VL	Previous laparotomy	Adhesions	Adhesiolysis	Cholecystectomy	Early evolution	Late evolution
1. N.L.	f/56	PC insertion	hysterectomy	+	yes		CAPD after 15 days	cuff-shaving
2. R.F.	f/55	PC insertion	hysterectomy	±		yes	CAPD after 21 days	umbilical hernia
3. R.D.	f/73	PC insertion	appendectomy				CAPD after 15 days	umbilical hernia
4. A.G.	f/84	PC insertion	cholecystectomy	±			CAPD after 15 days	umbilical hernia
5. M.T.	f/46	PC insertion				yes	CAPD after 21 days	incisional hernia
6. A.P.	f/69	PC insertion	hysterectomy				CAPD after 15 days	
7. G.D.	m/52	PC insertion	appendectomy	±			CAPD after 15 days	ESI chronically
8. A.M.	m/59	PC obstruction	appendectomy	+ + +		yes	PC removal	HD
9. V.D.	f/65	PC insertion	caesarian section, hysterectomy	±			CAPD after 15 days	umbilical hernia
10. N.C.	m/90	PC insertion	cholecystectomy	±			CAPD after 15 days	APD right hydrothorax
11. N.D.	m/68	PC insertion	appendectomy	±			CAPD after 15 days	bilateral inguinal hernia
12. G.M.	f/74	PC insertion	cholecystectomy				CAPD after 15 days	
13. A.P.	f/74	PC insertion	cholecystectomy				CAPD after 21 days	
14. C.M.	f/40	PC insertion	laparotomy for trauma	+ +	yes	yes	CAPD after 30 days	transplantation
15. A.L.	f/47	PC insertion	cholecystectomy			yes	IPD for a week	

Table 2. Videolaparoscopy for peritoneal catheter insertion in ESRD-patients with prior abdominal surgery: pros and cons

Pros:
• Low risk of visceral perforation
• Evaluation of the extent of adhesions
• Adhesiolysis (when indicated)
• Exact peritoneal catheter location by direct visualization
• Immediate test for overall peritoneal catheter function
Cons:
• Skilled surgeon and team
• General anaesthesia
• Cost of instrumentation
• Need of an operating theatre

Therefore, we decided to remove the peritoneal catheter and to switch the patient to HD.

For all the patients the mean hospitalization period was 3.1 ± 1.5 days and the mean follow-up was 19 months (range 3–44). Only one patient exhibited complications; an incisional hernia of the abdominal wound in the site of the 10 mm trocar.

Discussion

PD has now become an established and increasingly used form of renal replacement therapy. Its use has provided a means of regulating some patients who would otherwise have been denied therapy because HD was inappropriate, unavailable or failed. Therefore, any efforts and methods to improve PD outcome and decrease morbidity are welcome. For this reason we report our experience of videolaparoscopy in our PD-programme.

The current algorithm for patients enrolling into a PD-programme is the primary insertion of the peritoneal catheter using a traditional technique performed under local anaesthesia. If the patients had a previous abdominal operation, peritoneal catheter placement utilizing a conventional procedure cannot be safely performed. Therefore, we performed peritoneal catheter insertion with videolaparoscopy in patients who showed extensive abdominal scars due to previous operations. It is more difficult to perform a safe peritoneal catheter insertion, particularly when scars are present in the lower part of the abdomen since puncture of intestinal loops adhered to the parietal peritoneum is possible. Furthermore, the presence of widespread adhesions may cause difficulty in peritoneal catheter placement, reduction of surface exchange of peritoneal membrane and/or drain failure of dialysis solution. A low risk of accidental viscera perforation is associated with videolaparoscopy since the Verres needle used to introduce the CO_2 pneumoperitoneum and the 10 mm trocar used to introduce the laparoscope connected to the camera are inserted far from the abdominal scars. Videolaparoscopy allows for direct visualization of the extent of adhesions and performance of adhesiolysis. Adhesiolysis is not feasible when peritoneal catheter implantation is performed with peritoneoscopy [3]. Videolaparoscopy also facilitates choosing the most appropriate place for peritoneal catheter insertion and to visualize whether the peritoneal catheter tip is correctly placed in the peritoneal cavity. Another advantage of videolaparoscopy is the immediate test for overall peritoneal catheter function. The operating room time was nearly the same as other techniques currently available for permanent peritoneal catheter insertion. The shortcomings are the necessity to perform the procedure under general anaesthesia, because CO_2 insufflated into the peritoneal cavity is painful, and the high cost of the surgical procedure due to the requirements of an operating theatre possessing videolaparoscopic instrumentation, as well as a surgeon and a team experienced in videolaparoscopy procedures (Table 2).

Another indication of videolaparoscopy in a PD-programme is to perform an abdominal surgery [4]. The use of videolaparoscopy for abdominal surgery, in PD-patients, may present some practical advantages. Cholecystectomy performed before starting PD might be a prophylactic measure to help prevent peritonitis. Moreover, when performed during PD-treatment, videolaparoscopy allows the patients a unique opportunity to resume PD immediately after the surgical procedure, thus avoiding the need for transient HD.

Finally, videolaparoscopy is mandatory in the diagnosis and the treatment peritoneal catheter malfunction when conventional manoeuvres fail. Mechanical dysfunction of peritoneal catheter can occur either as a result if inner obstruction or omental wrapping and tamping [5]. Only with videolaparoscopy can the cause of the malfunction be determined and can surgeons carry out therapeutic correction for peritoneal catheter rescue where intra-abdominal pathological situations do not prevent the continuation of PD.

In conclusion, alongwith the undeniable advantages, remains the disadvantage that videolaparoscopy must be carried out by an expert surgeon in an operating theatre while the patient is under general anaesthesia. Nevertheless, in spite of the high cost of the procedure, videolaparoscopy was shown to significantly decrease, in dialysed patients, the treatment costs for cholecystectomy by reducing hospitilization days. It also eliminates the expensive interval HD and allows a prompt renewal of social and professional activities.

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