

The challenge of abdominal surgery in peritoneal dialyzed patients

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ABSTRACT

Introduction. Peritoneal dialyzed (PD) patients' surgical emergencies and even routine interventions represent acts that few surgeons agree to perform, because of the complications and risks induced by this method along to those of surgery itself.

Methods. Between March 2009 and March 2014, we conducted a study including PD and hemodialyzed (HD) individuals in need of abdominal surgery, and the duration of each type of intervention was compared in the 2 groups.

Results. In the PD group, 42 surgical interventions were performed – 9 cholecystectomies, 8 intestinal occlusions, 3 appendectomies, 6 interventions for intestinal tumors, 2 gynecological interventions, 14 surgical cured hernias. In HD subjects ($n = 35$) we recorded: 11 cholecystectomies, 11 intestinal occlusions, 2 appendectomies, 8 intestinal tumors, 8 hernia surgical cures, 4 hysterectomies. The mean duration of surgery was 67.18 ± 19.70 minutes in PD group, respectively 46.87 ± 20.55 minutes in HD group, a significant statistical difference ($p = 0.0032$).

Conclusions. PD represents a type of renal replacement therapy with great impact on abdominal surgery conduct, highly increasing the operating time.

Keywords: peritoneal catheter, early complications, biochemical predictors

INTRODUCTION

For patients undergoing renal replacement by peritoneal dialysis (PD), not only emergency surgery, but also routine interventions that are properly planned and prepared represent surgical acts that few surgeons agree to perform. This reluctance is insufficiently documented by

the limited number of scientific studies that followed surgery in PD patients; literature data presenting the additional risk factors for these patients and additionally, proposing medical strategies to improve postoperative outcome is very rare.

We conducted a study that examines an important aspect of the surgery performed in PD

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patients – the duration of the operating time - comparing the group of PD subjects with a control one of chronic hemodialyzed (HD) patients to whom we have performed the same types of abdominal interventions.

METHODS

The study focused on patients with stage 5 chronic kidney disease (CKD), undergoing renal replacement therapy, requiring abdominal surgery between March 2009 and March 2014; we included all chronic dialyzed patients hospitalized for a condition unrelated with the dialysis method in the Department of Surgery, “Sf. Ioan” Emergency Clinical Hospital, Bucharest. We formed two groups of patients: the PD and HD group, respectively.

RESULTS

We have listed a total of 42 patients in the PD group *versus* 35 patients in the HD group. The general characteristics of patients and demographics of the two groups are centralized in Table 1.

TABLE 1. General characteristics and demographics of PD and HD groups

Features	Group PD	Group HD
Total number	42	35
No. of men (percent)	24 (57.14%)	19 (54.28%)
No. of women (percent)	18 (42.86%)	16 (45.72%)
The mean age +/- SD	60.08 +/- 11.64	56.16 +/- 31.9
Duration of dialysis		
< 6months (n / percent)	4 (9.52%)	1 (2.85%)
6 months – 2 years (n / percent)	21 (50%)	13 (37.14%)
> 2 years (n / percent)	17 (40.47%)	19 (54.28%)

The PD group included 42 abdominal surgery unrelated to dialysis method – 9 acute lithiasic cholecystitis; 8 intestinal occlusions; 3 appendectomies; 6 interventions for intestinal tumors, 2 gynecological interventions - uterine fibroids and ovarian cyst, 14 surgical hernia cures (Figure 1). The HD group totaled 35 surgeries, as follows: 11 cholecystectomies, 2 intestinal occlusions, 2 appendectomies, 8 interventions for intestinal tumors, 2 surgical hernia cures, 4 gynecological interventions for hysterectomy (Figure 1).

From the surgical protocols – by studying the operation records of each operating room – we extracted the duration of the interventions for

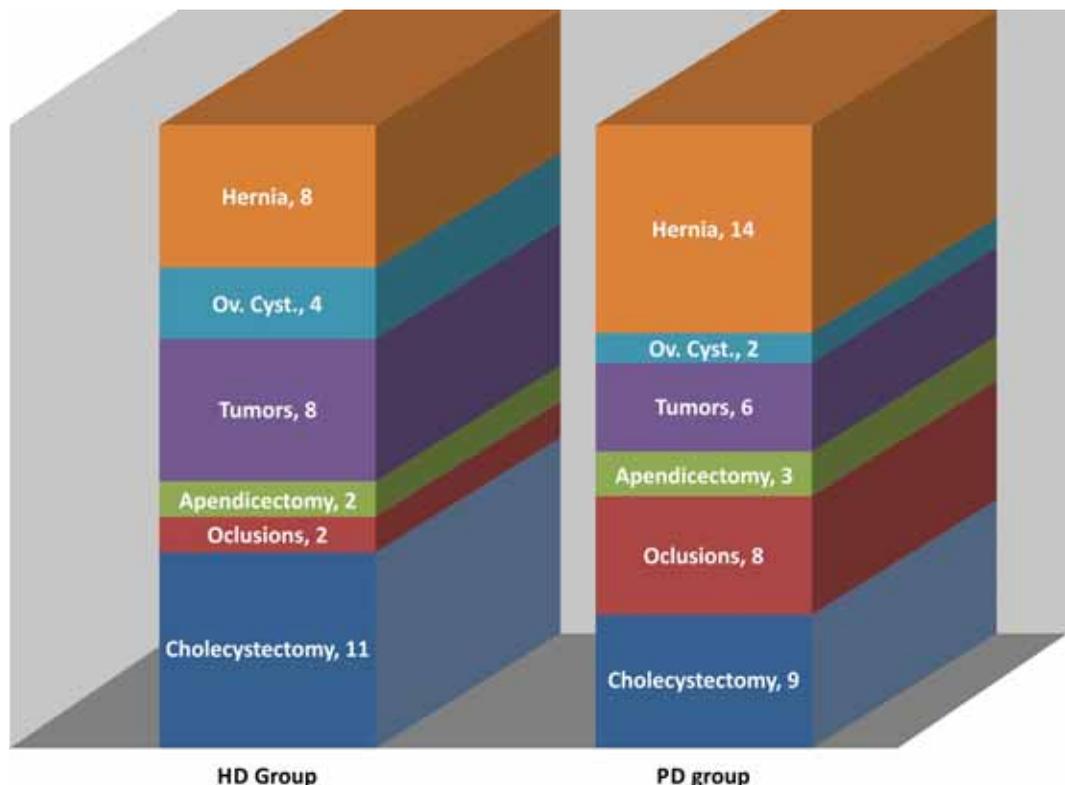


FIGURE 1. Distribution of surgery type in the two groups

TABLE 2. Abdominal surgical interventions in both groups

Intervention type		Mean duration PD group	Mean duration HD group	Statistics
Cholecystectomy	No.	n = 9	n = 11	$p = 0.000000005$
	Duration	77.4 +/-6.82 min	50 +/- 5 min	$T = 10.17 > 1.30$
Occlusion	No.	n = 8	n = 2	$p = 0.0094$
	Duration	65+/-5.34 min	50+/-7,07 min	$T = 3.40 > 1.30$
Appendicectomy	No.	n = 3	n = 2	$p = 0.0021$
	Duration	41.66 +/-2.88 min	20 +/-0 min	$T = 10.09 > 1.30$
Colectomy	No.	n = 6	n = 8	$p = 0.000005$
	Duration	91.66+/-4.08 min	74.37+/-4.17 min	$T = 7.75 > 1.30$
Hernia cure	No.	14	8	$p = 0.0000003$
	Duration	82.85+/-5.44 min	60.62+/-6.23 min	$T = 8.76 > 1.30$
Gynecological surgery	No.	2	4	$p = 0.0055$
	Duration	47.5+/-3.53 min	26.25+/-4.78 min	$T = 5.45 > 1.30$
Total number, mean duration	No	28 + 14 (42)	35	$p = 0.0032$
	Duration	67.18+/-19.70 min	46.87+/-20.55 min	$T = 4.42 > 1.30$

each of these surgeries, assessing the mean time recorded. Benchmarking and statistical analysis of data on each type of intervention and groups are summarized in Table 2.

Statistical analysis proves that the duration of the surgical act is significantly increased in all types of interventions practiced to PD patients, excepting the intestinal occlusions, for which there are not important differences between the mean durations in both groups. Therefore, we must emphasize that the interventions for the HD group for intestinal obstruction have been performed in patients with previous history of PD – patients switched to HD after stopping the PD method. Both patients in the HD group who were operated for intestinal obstruction underwent 3 and respectively 4, 5 years of PD before changing to HD.

The average duration of abdominal interventions was 67.18+/-19.70 minutes in PD group and 46.87+/-20.55 minutes in HD group, with a statistically significant difference ($p = 0.0032$).

DISCUSSIONS

The laparoscopic approach to abdominal surgery has many benefits – e.g.: minor parietal trauma, rapid recovery, overview of peritoneal cavity (1-5). It requires, however, a longer time for the patient in the surgery room, unlike patients who decide for classical surgery. General anesthesia with endotracheal intubation is mandatory, with all necessary perioperative preparations.

Most of our patients underwent laparoscopic surgery. Similar to peritoneal catheter insertion technique, the laparoscopic abdominal in-

tervention for any pathology in PD patients has some specific characteristics (6-8). The induction of pneumoperitoneum was achieved in most cases by using *Hasson* open method. *Hasson* method is safer than *Veress* needle approach, but requires a longer duration, with an average of 10 minutes. A particular attention for this method is given to the muscle plan homeostasis, when opening muscle sheath and hemostasis in blood vessels of the properitoneal space. After these procedures, the following steps are required: the dissection around the umbilical gateway, trocar insertion, sealing wound achievement using 1 – 3 wires and CO₂ insufflation. *Veress* needle was used only when placing peritoneal dialysis catheter in patients without abdominal scars.

Regardless of the cause, the first step of the intervention is represented by the exploration of the entire peritoneal cavity and restoration of local anatomy. This phase is significantly longer in patients on dialysis, but comparable to that of open surgery. The multiple adhesions and abdominal loculations require a thoroughly dissection, fluid vacuuming (with sampling for culture and antibiogram) and removal of fibrin bands (2). These aspects extend the operating time by an average of 15 minutes.

The advantage is underlined by the possibility of exploring in full the entire peritoneal cavity – from the bottom of Douglas sack up to interhepatodiafragmatic, subhepatic, parietocolic, submesocolic and intersplenodiafragmatic spaces (9-11).

If defects in the parietal viscera, the organs reduction into the peritoneal cavity and dissection were performed with an average of 8 minutes' prolongation of the total intervention time.

For the inguinal hernias (14 patients in the PD group), if any suspicion of intraperitoneal suppuration was excluded, parietal defect was operated in another session using extraperitoneal procedure. The dissection of the visceral adhesions can result in peritoneum or liver capsule injuries (4). Haemostasis tended to be achieved without causing injury for the underlying organs. We used monopolar hook, and *Ligasure* forceps or “harmonic scalpel”. When bleeding occurred during organ dissection, their solution involved an extension of the intervention with additional time from 5 minutes to 25 minutes.

For the 11 laparoscopic cholecystectomies for acute gallbladder pain in patients on peritoneal dialysis, the duration of the interventions were on average 20 minutes longer than in patients with cholecystectomy in HD group (11,12).

We practiced three appendectomies in patients with acute cecal suffering; the duration prolonged by 15 minutes was due to the abundant peritoneal lavage and the need to reposition the PD catheter. There was no need to remove the *Tenckhoff* catheter (13).

During digestive obstruction interventions ($n = 8$ cases), peritoneal exploration was difficult due to air and fluid distension. Sectioning the adherents ties led to the resumption of the bowel transit, assuming that the intervention

also involved repositioning of the catheter (mobilized from its original position by maneuvering exploration) (14,15). Exclusion of other obstructive causes by exploring the entire digestive tract extended the intervention with 20 minutes. We have found no differences between the two groups, because the two HD patients were operated for intestinal obstruction, and both former PD patients – which represented the real surgical challenge.

CONCLUSIONS

Our study highlights that the duration of abdominal interventions was statistically significant higher in PD patients group *versus* HD group. All types of interventions were affected, the highly significant difference being found in the duration of the cholecystectomies, but also in all other types of interventions. The difference in duration between PD and HD groups was minimal for the occlusions because HD patients who required emergency surgery for bowel obstruction were former PD patients and they had had similar problems with the patients from the PD group. Peritoneal dialysis influences the conduct of the abdominal surgery in patients chronically treated by this method, greatly increasing the total operating time and the complexity of the procedures.

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