

Clinical Value of Prophylactic Ureteral Stent Indwelling During Laparoscopic Colorectal Surgery

One of the hazards of colorectal surgery is ureteric injury. The aim of this study was to evaluate the results of ureteric catheterization regarding its safety and operative time. One-hundred sixty two patients underwent laparoscopic segmental left or right colectomy. The mean time for placement of ureteric catheters was 11.4 min for the right hemicolectomy and 11.3 min for the left hemicolectomy group. The mean preparation times for right hemicolectomy and left hemicolectomy (group 1 vs. group 2) were 54.7 vs. 39.1 min ($p=0.00001$) and 61.4 vs. 47.6 min ($p=0.006$), respectively. There were no significant differences in the laparoscopic operative time in either the right or left hemicolectomy groups (134.2 vs. 145.5 min and 198.4 vs. 170.1 min, respectively). There was no morbidity directly related to the ureteric catheters and in fact the incidence of postoperative urinary tract infection was lower in group 1 (1.5%) than in group 2 (5.3%) ($p<0.05$). Although the use of ureteric catheters added a mean of 11.3 min to the surgical procedure, the overall anesthetic time for right hemicolectomy was no longer than that for left hemicolectomy. The morbidity rate was quite acceptable. Thus, ureteric catheters may be useful in selected cases of laparoscopic left and right colorectal resections.

Key Words : Ureteral Catheterization; Laparoscopic Colorectal Surgery; Operative Time

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INTRODUCTION

The use of ureteric catheters in abdominal operations has been an area of debate. Some surgeons advocate this practice should help avoid ureteric injury (1-4), while others fear the potential injury during insertion and postoperative urinary complications (5, 6) including oliguria (2), anuria (5, 6), and urinary tract infection (7, 8). Moreover, the insertion of pre-operative ureteric catheters increases both the length of time in the operating room and that under anesthesia, as well as the overall cost of the procedure (1). Ureteric catheters may be particularly useful during laparoscopic colorectal procedures in which manual tactile localization is not possible. Therefore, the aim of this study was to evaluate the results of ureteric catheterization during laparoscopic colorectal procedures regarding its safety and operative time.

MATERIALS AND METHODS

All patients who underwent segmental right or left laparoscopic colorectal resections were assessed. Patient variables analyzed included surgical indications, history of prior abdominal surgery, time for stent placement (stent time), time from induction of anesthesia to surgical incision (preparation time),

total operative and total anesthesia times (beginning of stent insertion to completion of surgery), and morbidity.

All ureteric catheterizations were cystoscopically performed by one of six staff urologists using number 5 French ureteric catheters. The catheters were placed after induction of general endotracheal anesthesia and in the modified supine lithotomy position but prior to the commencement of the laparoscopic colorectal procedure. All stents were removed in the operating room immediately prior to reversal of anesthesia.

Statistical analyses were performed by use of the Student t-test and χ^2 test, as appropriate. Statistical significance was indicated by $p<0.05$.

RESULTS

One-hundred and sixty-two patients underwent laparoscopic segmental left or right hemicolectomy. In 67 patients, bilateral ureteric catheter placement was planned (Group 1), whereas in 95 patients, catheters were not utilized (Group 2). There were 31 males and 36 females with a mean age of 55 (range, 15-86) yr, 28 right hemicolectomy and 39 left hemicolectomy, in Group 1. Group 2 consisted of 46 males and 49 females with a mean age of 65 (range, 20-89) yr, 63 with right hemicolectomy and 32 with left hemicolectomy.

Surgical indications are listed in Table 1. Whereas 31 patients (46.3%) in Group 1 had a prior laparotomy, this was true in only 28 (29.5%) patients in Group 2 ($p < 0.05$). The mean time for placement of ureteric catheters was 11.4 min in the right hemicolectomy and 11.3 min in the left hemicolectomy groups. The mean preparation times for right hemicolectomy and left hemicolectomy Group 1 vs. Group 2 were 54.7 vs. 39.1 min ($p = 0.00001$) and 61.4 vs. 47.6 min ($p = 0.006$), respectively. There were no significant differences in the laparoscopic operative time in either the right or left hemicolectomy groups (134.2 vs. 145.5 min and 198.4 vs. 170.1 min, respectively). However, due to the additional preparation time, the overall anesthesia time was significantly longer in the left hemicolectomy group (272.3 vs. 235.0 min) ($p < 0.05$); however, there were no differences between Groups 1 and 2 relative to right hemicolectomy (216.3 vs. 198.8 min, respectively). There was no difference in the postoperative morbidity (14.9% vs. 25.3%, respectively) (Tables 2, 3). There was no morbidity directly related to the ureteric catheters and in fact the incidence of postoperative urinary tract infection was lower in Group 1 (1.5%) than in Group 2 (5.3%) ($p < 0.05$) (Table 3). In two patients the catheters could not be inserted because of benign prostate hypertrophy in one and difficulty in finding the intravesical orifice in the other; another patient had only the left ureteric catheter placed due to obstruction of the right ureteric orifice.

DISCUSSION

One potential complication of colorectal surgery is ureteric injury. Moreover, during laparoscopic colorectal surgery,

Table 1. Indication for procedures

	Group 1 (%)	Group 2 (%)	Total (%)
Crohn's disease	26 (38)	14 (15)	40 (24)
Diverticulitis	25 (37)	7 (7)	32 (20)
Neoplasia	11 (17)	61 (64)	72 (44)
Others	5 (8)	13 (14)	18 (12)
Total	67 (100)	95 (100)	162 (100)

Table 2. Reasons for conversion to laparotomy

	Group 1		Group 2	
Right hemicolectomy	Adhesions	2	Adhesions	6
			Bleeding	3
			Anastomotic complications	2
Left hemicolectomy	Adhesions	4	Anastomotic complications	3
			Bleeding	2
	Unidentified ureter	3	Adhesions	2
		2	Unidentified ureter	1
			Bleeding	1
Total	11 (16.4)		18 (18.9)	

manual palpation is impossible. Some surgeons advocate the placement of ureteric catheters in order to avoid this complication especially during laparoscopy (1-4). The actual incidence of iatrogenic ureteral injuries varies in the literature. Andersson et al. (9) noted 5.7% of iatrogenic ureteric injury after abdominoperineal resection; Kramhoft et al. (10) noted 2% incidence for 569 cancer cases; Neuman et al. (11) reported 0.5 to 2.5% incidence during pelvic operations, and Graham and Goligher (12) cited less than 1% in 1605 operations. In our series, there was no iatrogenic ureteric injury in either group.

One prior study showed that preoperative placement of ureteric catheters increases the length of anesthetic time (1). In our study, although the mean preparation time was longer in the stent group than in the non-stent group, there were no differences in the laparoscopic operative time in either the right or left hemicolectomy groups. However, the mean time for placement of ureteric catheters was 11.3 min, rendering the overall anesthesia time only slightly longer than without the use of catheters.

There have been many reports on intraoperative and postoperative urinary complications attributable to urinary catheters. Intraoperative complications have included laceration or perforation of the ureter during the stent placement. Bothwell et al. (1) noted a 2.2% intraoperative complication rate in 561 prophylactic ureteric catheterizations, similar to the 2% rate reported by Leff et al. (2). The incidence of iatrogenic injury to the ureter during colorectal surgery is reportedly from 1 to 10 percent (2, 9, 10, 13). In our study, stent indwelling group was included more difficult cases including Crohn's disease and diverticulitis, however, there was no iatrogenic ureteric injury during laparoscopic colorectal resections in either group. This result reveals ureteral catheterization is needed to difficult cases. Postoperative urinary morbidity may include oliguria, anuria, or urinary tract infection. Oliguria is caused by transient ureteral obstruction due to edema of the ureteral mucosa following stent removal (14). Wood et al. (5) reported a 7.6% incidence of oliguria or anuria in 92 routine prophylactic ureteric catheterizations, while Sheikh et al. (6) reported a 5.1% incidence. There are some reports of urinary tract infection after prophylactic ureteric catheterization (7, 8). In our study, there was no morbidity directly

Table 3. Postoperative morbidity

	Group 1 (%)	Group 2 (%)	p-value
Urinary complications			
Right colectomy	0/28 (0)	2/63 (3.2)	NS
Left colectomy	1/39 (2.6)	5/32 (15.6)	<0.05
Total	1/67 (1.5)	7/95 (5.3)	NS
General complications			
Right colectomy	3/28 (10.7)	14/63 (22.2)	NS
Left colectomy	7/39 (17.9)	10/32 (31.3)	NS
Total	10/67 (14.9)	24/95 (25.3)	NS

related to the ureteric catheters and in fact the incidence of postoperative urinary tract infection was lower in the catheterized group. Although statistical significance was addressed, the incidence was similar.

Although the use of ureteric catheters added a mean of 11.3 min to the surgical procedure time, the overall anesthesia time for right hemicolectomy was only slightly longer than that without the use of catheters. Moreover, the morbidity rate was quite acceptable. Thus, ureteric catheters may be quite useful in selected cases of laparoscopic left and right colorectal resections.

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