



## Case Report: Early Recognition and Repair of Distal Iatrogenic Ureteral Injury During Laparoscopic Rectal Surgery



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### ABSTRACT

**Background:** Ureteral injury is an uncommon complication of the colorectal procedure. The colorectal procedure is the second most common cause of ureteral injury. The laparoscopic approach for colorectal surgery has contributed to the increase of ureteral injury. Delayed diagnosis of the iatrogenic ureteral injury is associated with higher morbidity. However, the early diagnosis of ureteral injury during the operation is difficult. We presented an early recognition and laparoscopic repair of iatrogenic ureteral injury during laparoscopic rectal cancer surgery cases and the strategy for recognizing and managing that injury for the surgeon.

**Case Presentation:** A Male, 34 years old, had an iatrogenic ureteral injury during laparoscopic low anterior resection for rectal cancer. The left distal ureter was transected by an energy device. The diagnosis of ureteral injury was prompt. The repair of the ureter was done endo-laparoscopically. The patient had an uneventful recovery and was discharged on day 6 after surgery.

**Conclusion:** The iatrogenic ureteral injury, although uncommon, is a serious complication of laparoscopic colorectal surgery. Direct visual identification of the distal ureter is mandatory in every rectal surgery. The iatrogenic ureteral injury is not an indication for open conversion when there is an adequate resource to do the endo-laparoscopic ureteral repair.

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## 1. Introduction

Colorectal cancer is one of the top three cancer in Indonesia. It occurs in 19.1 men and 15.6 women in every 100.000 population.<sup>1</sup> Colorectal cancer resection is one of the primary treatments for colorectal cancer. Laparoscopic-assisted colectomy was first reported in 1991 by Jacobs et al.<sup>2</sup> Soon after, the laparoscopic approach for colorectal surgery was widely adopted across the world as an option to open approach. This acceptance is due to several advantages offered by laparoscopies, such as lesser post-operative pain, earlier recovery, and shorter hospital stay than the open approach.<sup>3</sup> The short and long-term oncological outcomes of colorectal cancer were also similar in the laparoscopic and open approach by an experienced surgeon.<sup>3,4</sup> Despite these benefits, the laparoscopic approach is also associated with higher intraoperative complications.<sup>4</sup>

The ureter lies in the retroperitoneum, it extends down from the kidney and curves toward the

bladder. Because of its anatomical position, the ureter is relatively protected. The most common site for injury is the distal part which may be distorted by a pathological lesion in the pelvic cavity.<sup>5</sup> Ureter identification is mandatory during colorectal surgery to prevent iatrogenic injury.

Ureteral injury is an uncommon complication of colorectal surgery with around 0.3% - 1.5% up to 6% frequencies reported.<sup>6,7</sup> Colorectal surgery is the second most common procedure that causes ureter injury after the gynecological procedure.<sup>6,8</sup> The widespread use of laparoscopy has also contributed to the cumulative increase in ureteral injury.<sup>6,9</sup> Post-operative or late recognition of iatrogenic ureteral injury is associated with hydronephrosis, urinoma, impairing renal function, and even peritonitis.<sup>7,9</sup> Intraoperative recognition of ureteral injury will result in fewer complications. However, intraoperative recognition is difficult.<sup>9</sup>

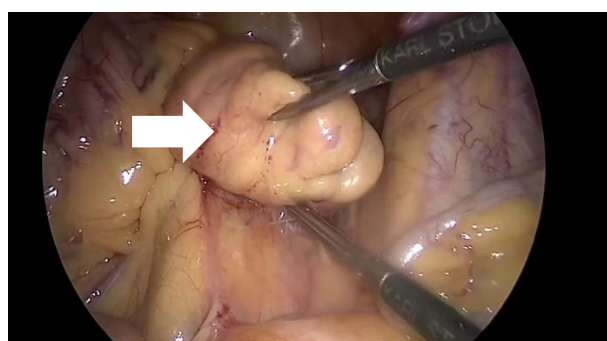
A minimally invasive approach for iatrogenic ureteral injury repair during laparoscopic surgery has been preferred over the open approach.

It offers the same benefit as other minimally invasive procedures in terms of post-operative pain and hospital stay.<sup>10</sup> In this report, we presented an early recognition and laparoscopic repair of iatrogenic ureteral injury during laparoscopic rectal cancer surgery cases and the strategy for recognizing and managing that injury for the surgeon.

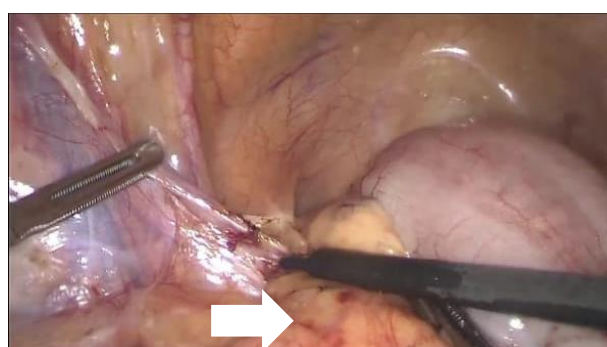
## 2. Case Presentation

A male, 34 years old, underwent laparoscopic low anterior resection for rectal cancer. The histopathologic report from the biopsy revealed an adenocarcinoma. The Imaging showed a locally advanced tumor without adhesion to another organ. Laparoscopic surgery was done with the usual trocar placement manner.

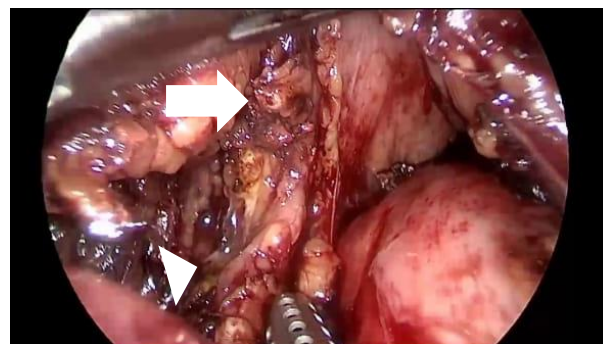
The intraoperative staging was revealed no distant metastasis, the tumor has penetrated the visceral peritoneum and cause adhesion in the left peri-colorectal tissue. The Inferior mesenteric artery was safely high ligated. The left middle third ureter was successfully identified and preserved. After sharp dissection in the holy plane (inter-fascial space), the lateral dissection was carried out.



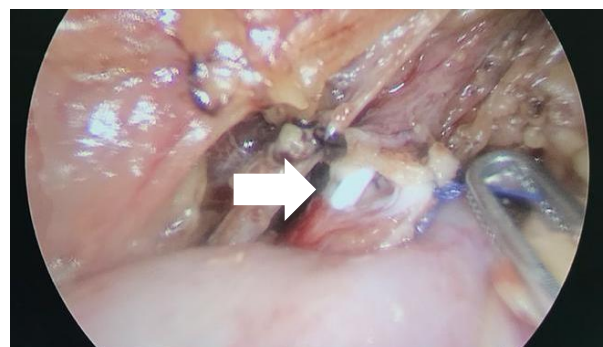
(a)



(b)



(c)



(d)

Figure 1. Laparoscopic anterior resection: (a) The tumor was bulky (arrow), (b) The tumor adhesion caused the left lateral structure adhered and displaced to the median, (c) The ureteral injury was recognized after visualized the distal stump (arrow) and the proximal stump (arrow-head), (d) The ureter was approximated with internal stenting (double J stent) (arrow)

Due to anatomical distortion in the left side, the left lateral dissection was accidentally too lateral. This caused the left distal ureter transection by an energy device. The injured ureter was searched after realizing the wrong dissection plan. The distal stump was identified near the fundus of the bladder. The proximal stump was recognized by the urine stream outflow.

The urologist was being consulted after the diagnosis of iatrogenic ureteral injury. The ureter was freed from the surrounding structures to facilitate anastomosis. The internal stenting (double J stent) was introduced using the cystoscopy to the distal ureter stump, and then the proximal ureter stump intubation was aided laparoscopically. The ureter can be primarily sutured without anastomotic tension using PGA and internal stenting.

The tumor specimen was eviscerated through the sufficient mid-line incision, below the umbilicus. The colorectal anastomosis was done using a circular stapler, and the protective stoma was created in the terminal ileum.

The patient was observed on day 1 after surgery in the intensive care unit and then transferred to the

regular ward on day 2. The abdominal drain production has been evaluated daily, and then being removed on postoperative day 5. The patient had an uneventful recovery and was discharged on postoperative day 6.

### 3. Discussion

Laparoscopic colorectal surgery is the second most common procedure to cause an iatrogenic ureteral injury.<sup>8</sup> Delayed recognition of ureteral injury will cause severe morbidity to the patient, but intraoperative diagnosis of the iatrogenic ureteral injury is also difficult. The important key is always to consider the ureteral injury in your operation until proven otherwise, especially in the case of anatomical distortion.<sup>10</sup> The ureteral injury can be partial laceration, total transection, ligation, thermal injury, or devascularization.<sup>8</sup> Preoperative ureteral stent placement will not decrease the rate of iatrogenic ureteral injury, so the visual identification of the ureter is always mandatory in rectal surgery.<sup>11</sup> In our case, the diagnosis of ureteral injury was initiated by high suspicion due to anatomical distortion that caused too lateral dissection of the rectum. The ureter was then searched and the injury was confirmed in the distal part. Although the middle part of the left ureter was recognized earlier during the operation, the distal injury still occurred. When the ureter cannot be found in the case of ureteral injury suspicion, another technique such as ureteral catheter placement by using cystoscopy or retrograde pyelography can be used.<sup>11</sup>

The site of injury in our case is in line with a previous study that found the most common injury site is the distal third of the left ureter.<sup>6</sup> This may be associated with the place of the rectosigmoid transition on the left side. The ureter injury was diagnosed intraoperatively, and the ureter stump was identified visually. The ureter was totally transected by an energy device. Buono et al, have reported the safety of uretero-ureteral anastomosis in the distal ureter, even at the <5 cm distal ureter stump, instead of ureter neo-implantation.<sup>7</sup> In our case, the no-tension primary uretero-ureteral anastomosis was done with internal stenting.

Laparoscopic colorectal surgery is an advanced laparoscopic procedure with a steep learning curve. The learning curve can be reduced in a surgeon who already had advance laparoscopic skills. Several studies showed that laparoscopic colorectal resection has a higher incidence of iatrogenic ureteral injury<sup>6,9</sup>, whereas others found vice versa.<sup>12,13</sup> The presence of iatrogenic ureteral injury is not the indication for converting to open surgery. The most common risk

factors for open conversion are male, obesity, adhesion, and rectal surgery.<sup>14,15</sup> The open conversion should not be considered a failure.<sup>16</sup> The surgeon should always have this option in every laparoscopic surgery. Primary distal ureter anastomosis can be safely done with an endo-laparoscopic approach. However, when there is no adequate resource, open anastomosis will be an option.

### 4. Conclusion

The iatrogenic ureteral injury, although uncommon, is a serious complication of laparoscopic colorectal surgery. Direct visual identification of the distal ureter is mandatory in every rectal surgery. The iatrogenic ureteral injury is not an indication for open conversion when there is an adequate resource to do the endo-laparoscopic ureteral repair.

### Ethical Approval

There is no ethical approval.

### Conflicts of Interest

The authors declare no conflict of interest.

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### Author Contribution

All authors contributed in the conceptualization, preparation, drafting, review, and final editing of the manuscript.

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