Ureteroenteric Strictures

Subjects: Allergy

Contributor: Mitsuru Saito

Benign ureteroenteric anastomosis strictures (UESs) are one of many critical complications that may cause irreversible disability following robot-assisted radical cystectomy (RARC).

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1. Introduction

Despite becoming a standard surgical procedure for the definitive treatment of patients with localized muscle invasive bladder cancer, robot-assisted radical cystectomy (RARC) remains complex with a non-negligible learning curve and numerous complications [1]. The RAZOR trial, which was conducted to compare RARC with open radical cystectomy (ORC), showed no difference in three-year progression-free survival between both procedures, with RARC exhibiting significant advantages in estimated blood loss, blood transfusion rates, and length of stay [2][3]. In terms of the incidence of complications, several randomized trials have demonstrated that both RARC and ORC have comparable incidence rates of common complications [2][4][5]. However, reported complication rates of RARC have ranged from 30% to 70%, suggesting the urgent needed for intra- and peri-operative strategies to reduce complications [6]. RARC has been known to have lower rates of severe short-term complications within 90 days after surgery [7]. However, its long-term complications have been relatively high-grade, with insufficient evidence available to make definitive conclusions on the long-term complications of RARC [8][9]. One of the short- and long-term complications is a benign ureteroenteric anastomosis stricture (UES), a critical complication that can cause irreversible disability such as chronic kidney dysfunction.

2. Etiology

Most of the retrospective studies suggest that multiple factors are associated with UES and its prevention after RARC. First of all, the surgeon’s experience seems to be strongly associated with the incidence of UES [10], given that several studies showed higher rates of UES in initial introductory cases at each institution [11][10]. Given the nature of robotic surgery, less haptic feedback and magnified visualization can cause excessive handling of the ureters. Compromised vascularity of the ureters can also be potentially associated with UES [11]. Ahmed et al. emphasized the importance of sound surgical technique, including adequate ureteral dissection while maintaining sufficient adventitia, avoiding cauterization, wide spatulation, and a watertight anastomosis that is not under tension [11], which are rather difficult to evaluate objectively [11]. A study by Yuh et al. on 14 patients with UES among a total of 241 consecutive patients who underwent RARC revealed that inadvertent kinking or twisting of the ureters and/or diversion might occur, causing urinary diversion-related complications [12]. The type of anastomosis (running or interrupted sutures), the length of ureters, and the adoption of an antireflux technique may also influence the incidence of UES. A previous study demonstrated that patients with postoperative anastomotic urinary leakage had approximately four times higher rates of UES compared to those who did not [11]. Given that urinary tract infections (UTIs) impair healing and cause scarring with the release of inflammatory mediators and proteases, UTIs may be associated with the presence of UES. Moreover, preoperative kidney function and nutritional status may be considered potential risk factors for UES [11].

A population-based study using a surveillance, epidemiology, and end results program demonstrated that RARC (vs. ORC) and preoperative hydronephrosis were significantly associated with the development of UES [13]. Apart from the aforementioned factors, multivariable analysis in a single-center study involving 440 RARC cases with a 13% incidence of UES showed that body mass index, intracorporeal urinary diversion, length of the right resected ureter, estimated glomerular filtration rate 30 days after RARC, urinary tract infection, and leakage were independent predictors for UES [11]. Taken together, the aforementioned studies strongly suggest that various known and unknown factors are involved in the occurrence of UES.

3. Management

Although no standardized therapies have been established for the treatment of UES after RARC, open revision had been the gold standard management of UES after urinary diversion due to its higher success rate as compared to the endoscopic approach [11]. However, open revision is generally challenging and has been accompanied by a high risk of additional complications [14][15]. Therefore, initial management of UES via endoscopic or percutaneous techniques may be attempted. One study including 58 patients with UES after RC showed that endoscopic intervention succeeded in 51.3% of the patients [16]. On the other hand, 78% of the 32 patients who underwent open revision via direct implantation or tissue interposition (six Boari flaps and seven ileal segments) achieved long-term success [16]. Another retrospective study on 41 patients with UES after RC found an 87% success rate for open revision [17]. The same study also stated that the addition of the chimney modification to the orthotopic neobladder facilitated surgical repair [17]. In cases with very severe bilateral strictures in ICUD-neobladder, Rayn et al. proposed a technique called “Reverse 7,” wherein the ileal segment is anastomosed to the bilateral renal pelvis on each side and then directly anastomosed to the top of the neobladder [18]. Robotic repair has also been considered as an option for the management of UES. However, evidence is scarce on this topic [19][20].

Ahmed et al. summarized the treatment of UES after RARC [11]. Accordingly, all 51 patients were initially treated with endoscopic and percutaneous approach, including 29 (57%) who underwent endoscopic and percutaneous management alone and 22 (43%) who required additional open (6 patients) or robotic (16 patients) surgical treatment. After a median follow-up of 23 months, 33 patients (65%) were free of disease, among whom 13 received endoscopic or percutaneous repairs, 15 received robot-assisted repairs, and 5 received open revisions. The authors also noted that open and robot-assisted revisions had a 100% success rate with the intraoperative complication (serosal tears) in two patients in the robot-assisted group [11]. With regard to risk factors for failure of UES treatment, male gender and higher BMI were reported to be associated with lower odds of successful endoscopic management.

Although the advantage of robotic repair over open repair remains unclear, robotic repair is an attractive option for the treatment of UES. Gin et al. reported the outcomes of 41 patients who underwent UES repair between 2007 and 2015, among whom 11.9% received the robotic approach [21]. The study showed that a 100% success rate was achieved without any re-operation during the median follow up of 16.3 months in a total of 50 renal units [21]. Tobis et al. reported that all four patients with UES after RC [19] were successfully repaired via the robotic approach, with no complications after a mean follow-up duration of 16 months [19]. A retrospective study comparing robotic repair (n = 7) and open repair (n = 5) in patients with UES after RC, including five RARC, showed that both approaches had comparable median estimated blood loss, operative time, and hospital stay [22]. Furthermore, three patients developed complications in the open group, whereas no complications were observed in the robot group [22]. During robotic repair, Tuderti et al. highlighted the usefulness of ICG injection via nephrostomy to identify the healthy ureter [23]. Kaouk et al. successfully introduced da Vinci SP ® , which is a single port platform, to treat three patients with UES, including one with bilateral UES after cystectomy [24]. Further validation studies on the usefulness of a conventional robot-assisted system or a single port robotic system are therefore required for repair of UES, especially for challenging cases with UES.

4. Conclusions

This review highlights the profound need to pay special attention to the prevention, early diagnosis, and meticulous repair of UES along with the appropriate follow-up of patients with UES after RARC. Careful establishment and implementation of standardized procedures, techniques, tips and tricks, and retrospective review of personal data and experience are crucial in detecting key reproducible points to reduce the incidence of UES, which is a devastating clinical complication after RARC.

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