



## Case Report of Robot Assisted Single-Site Hysterectomy after Concurrent Chemoradiotherapy for Cervical Cancer Treatment with Using Lighted Ureteral Stent

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### Abstract

**Introduction:** In cervical cancer, the management of residual tumor after Radiotherapy (RT) or Concurrent Chemoradiation Therapy (CCRT) is not well established. There are some reports that hysterectomy after RT or CCRT has benefit in reducing local recurrence. However fibrosis and inflammatory change after radiation makes it difficult to identify ureter lining. We present a case with using IRIS U-kit (Stryker, Kalamazoo, MI) to reduce ureter damage while performing extra-fascial hysterectomy after CCRT.

**Case Presentation:** A 59 years old woman was diagnosed cervical cancer stage Ib3. She underwent CCRT for the treatment. After 3 month, imaging test was done and it showed persistent disease of 29 mm in endocervix. Robot single site extra-fascial hysterectomy with bilateral oophorectomy was done with utilizing da Vinci® Xi Surgical system (Intuitive Surgical, Sunnyvale, CA). After anesthesia, IRIS U-kits insertion *via* ureteral sheath was done. Which illuminates the entire ureteral linings? The actual operation time took 38 minutes and time for IRIS U-kit insertion was 12 min. Patient was well tolerable and discharged after the surgery.

**Discussion:** With the IRIS U-kits enlightening ureteral linings during whole procedure, surgeon can precede surgery with confidence and not only reducing ureter injury but also making operation time shorter which will reduce morbidity and lead to shorter hospital stay. Thus IRIS U kits can be a safe and advanced way to reduce damage of ureter in various pelvic surgeries.

**Keywords:** Ureter injury; Hysterectomy; Cervical cancer; Lighted ureteral stent (IRIS-U kit)

### Introduction

Cervical cancer is the seventh most common cancer in Korea. Encouraging regular screening as part of the national health care service and new screening methods, such as liquid-based cytology, have steadily decreased the incidence of cervical cancer in Korea, but it remains the third leading cause of death among Korean women [1,2].

The standard treatment for early cervical cancer is widely accepted to be either radical hysterectomy or Radiotherapy (RT) alone. For locally advanced cervical cancer, Concurrent Chemoradiation Therapy (CCRT) is a standard treatment [3,4], but how best to manage residual disease following RT or CCRT is not clearly established [5]. Some studies have reported that hysterectomy after RT or CCRT does not benefit overall survival but we concluded that extra-fascial hysterectomy followed by RT or CCRT does decrease the rate of local recurrence and can be a viable option for the treatment of residual tumors after RT or CCRT in cervical cancer [4,6].

Conventionally, hysterectomy was performed *via* laparotomy, but the demand for minimally invasive surgery and the development of advanced surgical instruments have enabled hysterectomy through a laparoscopic approach, which has the advantages of faster recovery and shorter hospital stays [7]. Since the US Food and Drug Administration approved robotic surgery in the gynecologic field in 2005, the use of a robotic approach in hysterectomy has exploded, and robotic single-site hysterectomy has been performed since 2015, providing even faster recovery and shorter hospital stays than laparoscopic hysterectomy[8].

Regardless of the type and approach to performing the hysterectomy, ureter injury, both recognized and unrecognized, remains a major concern and a cause of morbidity [9]. The most

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**Received Date:** 23 Oct 2020

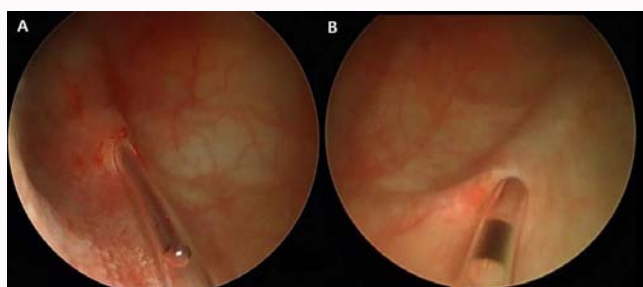
**Accepted Date:** 23 Nov 2020

**Published Date:** 26 Nov 2020

**Citation:**

Song C, Lee S, Chung H, Jang T-K, Shin S-J, Kwon S-H, et al. Case Report of Robot Assisted Single-Site Hysterectomy after Concurrent Chemoradiotherapy for Cervical Cancer Treatment with Using Lighted Ureteral Stent. *World J Surg Surgical Res.* 2020; 3: 1262.

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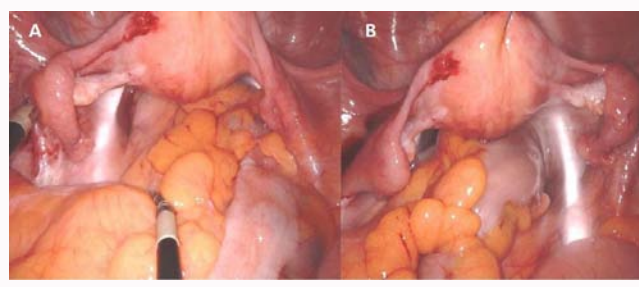
**Figure 1:** A: Ureteral sheath insertion in right ureteral opening in urinary bladder. B: Ureteral sheath insertion in left ureteral opening in urinary bladder.

common cause of ureter injury is iatrogenic, and hysterectomy accounts for more than half of iatrogenic ureter injuries [10]. Gynecologic surgeons always try to identify the ureter and are extremely careful not to damage it during the procedure. RT is an important tool for cancer treatment, but, in addition to treating cancer, it can also damage normal tissues within the range of the radiation, leading to RT-induced fibrosis and inflammatory changes in tissues, including organ adhesion. Pelvic organ adhesion and fibrotic changes are among the factors that make identifying ureter linings and hysterectomy after radiation challenging [11]. We therefore present a case that used a lightened ureteral stent IRIS U-kit (Stryker, Kalamazoo, MI) to visualize a ureter lining to avoid ureteral injury during a procedure.

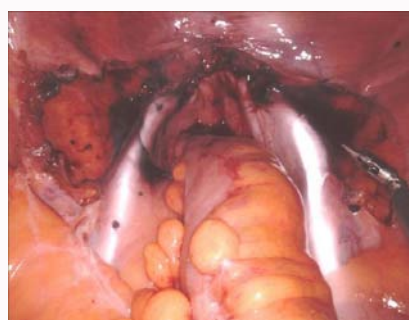
### Case Presentation

A 59-year-old patient visited the outpatient clinic at Dongsan Medical Center, Keimyung University, Daegu Korea, due to vaginal spotting for six months. She was diagnosed with cervical cancer at International Federation of Gynecology and Obstetrics stage Ib3 by a pelvic exam and other image tests, including magnetic resonance image, computed tomography, and Positron Emission Tomography (PET) scans. Punch biopsies of the lesion revealed invasive endocervical adenocarcinoma. Six cycles of weak CCRT were done. Cisplatin 40 mg per body surface area was administered intravenously each cycle and 5,040 Centigray (cGy) with 28 Fraction (fr) was irradiated externally and six adjuvant intracavitary RT of 3,000 cGy with 6 fr was irradiated. A PET scan image 3 months after the last radiation therapy showed a residual tumor of 29 mm in the endocervix. With the consent of the patient, we decided to perform an extra-fascial hysterectomy to remove the residual tumor with a single-site approach utilizing the da Vinci<sup>®</sup> Xi Surgical system (Intuitive Surgical, Sunnyvale, CA). After general anesthesia, the patient was placed in the dorsal lithotomy and Trendelenberg position. After full surgical drape, the guidewire was inserted into both ureteral orifices in the bladder trigone under cystoscopy and both ureteral sheaths were inserted following each guidewire (Figure 1). The lengths of the ureteral guidewire and stent were determined according to the height of the patient. After replacing the guidewire in the ureteral sheath, the cystoscope was removed and the IRIS U-kit was inserted via the ureteral sheath. The ureteral sheath is a translucent hollow catheter into which the IRIS U-kit is placed. The procedure was done without consulting a urologic specialist.

The IRIS U-kit is an optical fiber that can maintain lighting or constantly flash if connected to a lighting device. After installing the IRIS U-kit, the da Vinci<sup>®</sup> Xi docking procedure was done. After docking the da Vinci<sup>®</sup> Xi to the patient, an extra-fascial hysterectomy



**Figure 2:** A: Lightened IRIS U-kit in left ureter during the operation. B: Lightened IRIS U-kit in right ureter during the operation.



**Figure 3:** Post operation view.

with bilateral oophorectomy was done by routine procedure. From the start of the procedure of the hysterectomy to the completion of vaginal cuff suturing, both ureteral linings were lighted and fully visualized (Figure 2). The IRIS U-kit was removed after the vaginal cuff suture was finished. The actual operation or console time was 38 min and the time for IRIS U-kit insertion was 12 min. There were no complications, including ureter injury. The patient was well tolerable after the operation and discharged (Figure 3).

### Discussion

We placed an IRIS U-kit during robot-assisted single-site extra-fascial hysterectomy after CCRT in a cervical cancer patient. The IRIS U-kit fully visualized both ureter linings during the whole procedure. Identification of the ureters allowed the surgeon to proceed with the surgery with confidence, as it not only reduces the incidence of ureter injury but also makes the operation time shorter, which will reduce morbidity and lead to a shorter hospital stay. IRIS U-kits cannot be applied to all patients who undergo gynecologic surgery due to cost issues, but it is considerable when scheduled surgery is expected to have difficulties in identifying the ureters, such as previous radiation, pelvic adhesion, and anatomical variance. In addition, it might also be beneficial in radical hysterectomy, which requires full dissection of the ureters. In the future, more cases with IRIS U-kit insertion are necessary to compare operation time and IRIS U-kit insertion time and the effects on reducing ureter injuries. We had three prior cases of IRIS U-kit insertion, with the time for insertion ranging from 10 min to 18 min. One was type 1 hysterectomy in patient who had a prior operation due to endometriosis of ovaries, one was a sub-total hysterectomy in a patient who was diagnosed with uterine didelphys with adenomyosis and who had a prior pelvic surgery. Third case was a cervical cancer patient who underwent radical hysterectomy. Based on our experience, the IRIS U-kit insertion procedure is easily applicable after a few attempts and it does not seem to affect overall operation time as it has advantages in reducing operation time.

In conclusion we recommend IRIS U-kit as a safe and advanced approach for ureter damage reduction in various types of pelvic surgeries.

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