Scientific Foundation SPIROSKI, Skopje, Republic of Macedonia
Open Access Macedonian Journal of Medical Sciences. 2020 Apr 20; 8(C):40-43.
https://doi.org/10.3889/oamjms.2020.3888
eISSN: 1857-9655
Category: *C - Case Reports*
Section: *Case Report in Surgery*

Laparoscopic Nephroureterectomy in the Upper Urinary Tract Urothelial Carcinoma with Transvaginal Extraction

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Edited by: Ksenija Bogoeva-Kostovska
Citation: Hendri AZ, Yuri P, Zulfiqqar A, Hashfi A, Soerohardjo I. Laparoscopic Nephroureterectomy in the Upper Urinary Tract Urothelial Carcinoma with Transvaginal Extraction. Open-Access Maced J Med Sci. 2020 Apr 20; 8(C):40-43. https://doi.org/10.3889/oamjms.2020.3888
Keywords: Kidney; Radical nephroureterectomy; Laparoscopy; Transvaginal extraction
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Received: 29-Oct-2019
Revised: 7-Mar-2020
Accepted: 19-Mar-2020

Funding: This research did not receive any financial support
Competing Interests: The authors have declared that no competing interests exist

Abstract

BACKGROUND: The upper urinary tract urothelial carcinoma (UTUC) is a rare urological malignancy. Laparoscopic nephroureterectomy (LNU) is one of the options for minimally invasive surgery for UTUC. It has similar oncological outcomes compared to open nephroureterectomy. One of the techniques developed for specimen extraction is the transvaginal route. Transvaginal specimen extraction has advantages in the reduced risk of complications, faster recovery time, and better end result.

CASE PRESENTATION: A 37-year-old woman complained of intermittent pain in her right flank for the past 2 months, with significant weight loss. No other significant symptoms occurred. Her general condition was good with a Karnofsky Performance scale index is 90. In the right periumbilical area, there was a mobile, smooth mass palpated with the size of 10 × 12 cm. There was no tenderness. The patient underwent URS and biopsy of the right ureteral mass with pathological analysis resulting in UTUC. Then, the patient underwent laparoscopic radical nephroureterectomy.

CONCLUSION: Although the surgical procedure was safe for the patient and more effective in terms of less morbidity, faster healing time, and better cosmetic appearance, transvaginal extraction of the kidney needs to be further studied, particularly relating to the little experience of this new technique.

Introduction

The upper urinary tract urothelial carcinoma (UTUC) is a rare urological malignancy. It accounts for 1–5% of all urological tumors. Radical nephroureterectomy (RNU) with bladder cuff excision is the mainstay treatment for UTUC because of the rapid progression characteristic of UTUC, especially for muscle-invasive and/or high-grade disease [1].

Laparoscopic nephroureterectomy (LNU) was first introduced in 1991 by Clayman *et al.* LNU is considered as equally effective as open nephroureterectomy (ONU), which remains the most common procedure performed for treating high-risk UTUC and providing long-term local control and improving survival rate. However, LNU has less perioperative morbidity [2].

In LNU, the kidney is extracted through an incision, approximately 5–6 cm long to allow it to exit. The incision will become a low point in terms of cosmetics, while this incision can also become the reason of some complications and additional postoperative pain. Therefore, if the kidney extraction can be done without this incision, the surgery will be more effective with reduced risk of complications, faster healing time, and better end result [3].

One of the options to achieve that effect is using Natural Orifice Specimen Extraction (NOSE) method. The NOSE method is a recent concept of surgery that is defined by intraabdominal specimen extraction procedure that is performed through an access site made by creating an opening in natural orifices, for example, vagina, mouth, and rectum. There are two main advantages of this method, first is less post-operative pain, which is due to differences in the number of nerves involved, although the size of the incision required is same, the visceral organs have lesser innervation compared to abdominal wall. This will affect the level of pain post-operative pain, whereby the lesser amount of nerves incised, the less pain the patient will get. The second advantage is lesser visible scars since an incision made inside the vagina definitely will not be seen, when compared with abdominal specimen extraction that requires a 5–6 cm long incision; therefor, overall, the NOSE method is considered for more superior [3].

In 1993, Breda *et al.* first reported vaginal extraction of an intact kidney following a LNU. Gill *et al*. then reported a larger series in 2002. Branco *et al*. reported the first hybrid transvaginal NOTES (TV-NOTES) nephrectomy in a human body in 2008. Later, hybrid TV-NOTES simple, radical, living donor nephrectomy, and heminephrectomy were successively

reported. In 2010, Kaouk *et al.* reported the first pure TV-NOTES nephrectomy in clinical practice. However, due to the limitations of operative instruments and high technical difficulties, NOTES was still precluded from widespread adoption. Nevertheless, NOTES has been completed experimentally by transgastric, transrectal, transvaginal, and transvesical approaches. At present, transvaginal access is an ideal approach and the most commonly used in NOTES in urology [4].

Case Presentation

A 37-year-old woman came to Dr. Sardjito General Hospital with chief complain of flank pain. The patient complained that she felt intermittent dull pain in the right flank for 2 months before admission, but the pain was not radiating. The patient also complained about nausea without vomiting. The patient did not complain about fever, hematuria, nor passing stone. The patient complained that she felt a lumpon the right abdomen that was growing in size steadily for 3 months before admission; there was no tenderness of the lump. The patient felt significant weight loss in the past 3 months. The patient denied any family history of cancer.

On the physical examination, the general condition was good and vital signs were within normal limits. On the right periumbilical area, there was a mobile, smooth mass palpated with a size of 10 × 12 cm. There was no tenderness.

Contrast multi-slice computed tomography (MSCT) of the abdomen showing hypodense cystic lesion surrounding the right kidney with hydronephrosis Grade III, intraluminal filling defect also found in the proximal right ureter. Urinary cytology resulting in negative for High Grade Urothelial Carcinoma. Blood test showing renal functions within normal limits. The patient underwent ureterorenoscopy (URS) and biopsy of the right ureteral mass 1 month before admission with pathological analysis showing atypical cells with suspicion of urothelial malignancy.

Thirty minutes prior operation, 1 gr cefazolin was given as prophylactic antibiotic. The patient underwent general anesthesia and quadratus block and the patient was positioned in right lumbotomy

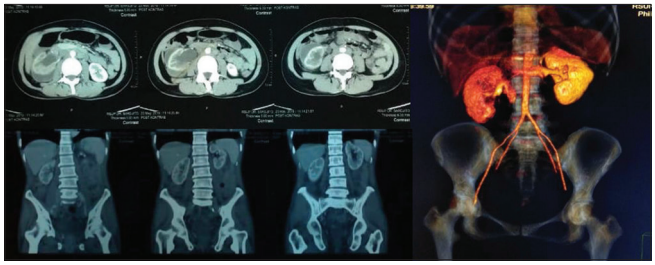

Figure 1: Abdominal MSCT with contrast and 3D reconstruction of kidney

(Figure 2a), then the following ports were inserted: 11-mm optical port at the umbilical point; 11-mm right hand working port along midclavicular line 2 cm below right arcus costarum at hypochondrium region; 5-mm left hand working port along the right midclavicular line at hypogastric region (Figure 2b).

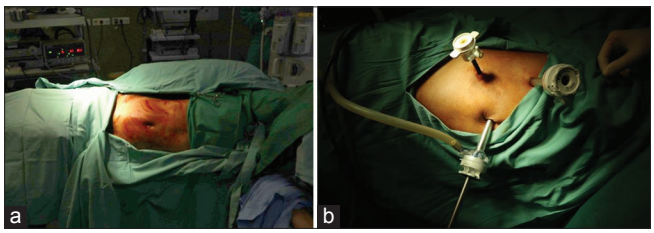

Figure 2: (a) Positioning of the patient, (b) trocar ports placement

The next step was the mobilization of the adjacent structures of the right kidney. The gonadal vein was clipped and divided. Then, the hilum of the kidney was identified and the renal artery was clipped and transected, followed by renal vein. Furthermore, the upper pole of the kidney was liberated. The lateral attachment was divided; the kidney was then mobilized completely. The proximal ureter at the level of promontorium was dissected.

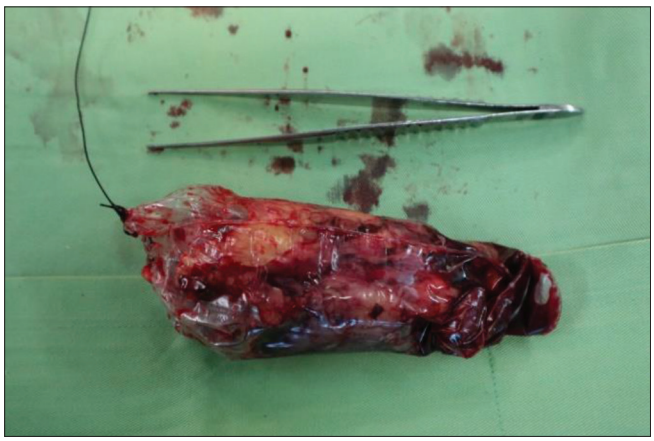

Figure 3: Extracted kidney

After that, the patient's position was changed to lithotomy and Trendelenburg. The intravesical ureter was circularly incised up to extravesical fat and entirely detached from the bladder using a cutting electrode.

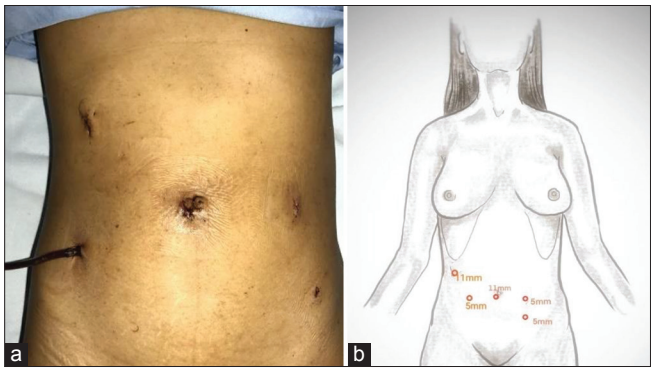

Figure 4: (a) Post-operative wound, and (b) schematic ports placement

Additional two 5-mm ports were placed on the left pararectal line and three-finger breadth inferiorly, respectively. Then, the distal ureter was dissected until the bladder cuff was completely detached. Following an

11-mm trocar was inserted under direct laparoscopic visualization and EndoCatch into the posterior vaginal fornix to enter the Douglas cavity. Then, the specimen was placed in Endobag. Endobag containing specimen was pulled out along with the ports. The posterior vaginal wall was dilated to help extract the specimens. Finally, the vaginal wall was sutured transvaginally. On closure, a vaginal tampon was then inserted.

The trocar was then detached, the abdominal cavity was insufflated, and the wound was sutured. A drain tube was inserted through the wound opening. An urinary catheter was also inserted to examine the urinary product. Total operating time was 3½ h with estimated blood loss was 300cc. There was no meaningful intraoperative complication.

One-day post-operative, the patient complained of minimal abdominal pain, and she received fentanyl through IV line. VAS score was 1–2, with no leakage from the vagina or operation wound, and the drain product was 200cc for the past 24 h. Second day post-operative, the pain was decreasing, the patient was still receiving fentanyl through IV line. The VAS score decreased to 1, still with no leakage from the vagina or operation wound, and the drain product was 20cc for the past 24 h. Then, the urinary catheter and vaginal tampon were removed. On the 3rd day post-operative, the analgesic was substituted with 1gr paracetamol IV every 12 h. The VAS score was 1, no leakage from the vagina or operation wound, and the drain product was 5cc for the past 24 h. Finally, the IV line and the drain were removed; the patient was discharged on 3rd day.

The surgical specimen was sent for pathological analysis resulting in infiltrating urothelial carcinoma toward renal parenchyma, perirenal fat, and ureter. On our 6-month follow up, we did not found any neither residual nor recurrent mass was according ultrasonographic examination.

Discussion

Laparoscopic techniques and instruments have major improvements over the past two decades. Surgically, the laparoscopic approach provides better visualization whereby there is more opportunity for precise and accurate surgery. Concerning patient interests, a systematic Cochrane Review shown that laparoscopic has potential patients benefits compared to open approaches [5]. NOTES was first introduced in 2008 for cholecystectomy [6]. With reported low learning curve and lower complication, NOTES and hybrid NOTES are now applied on kidney transplantation widely and successfully [7], [8].

This case is reported as the first experience of transvaginal laparoscopic RNU in Indonesia and was part of a stepwise program in our center using NOTEs approach in the advancement of new laparoscopic procedures. The natural characteristic of the vagina that can be expanded several times was also advantageous to make the extraction of a larger specimen [9]. The NOTES approaches are considered as an emerging field in urology, especially in recent developmental management of endoscopic, and these procedures are applicable in wide range procedures and are reported to have less pain compared to the transabdominal approach [10].

The benefits of LNU include less intraoperative blood loss, decreased post-operative narcotic analgesic use, and shorter hospital length of stay (LOS). Jens *et al* and Shaobin *et al.* reported slightly longer operating time (276.6 vs. 220.1 min), and significantly lower blood loss (240.9 vs. 462.9 mL) in the laparoscopic series. There were no differences of minor (12.9% vs. 14.1%) or major complication rate (5.6% vs. 8.3%) observed. Studies revealed a significant reduction of the morphine-equivalents dose and shorter LOS in the laparoscopy group [1].

According to the systemic review conducted by Jens *et al*., reported that a significantly higher proportion of pTa/Tis was observed in LNU group compared to ONU (27.52% vs. 22.59%; p = 0.047). However, there were no significant differences in other stages and pathologic grades. There were no statistically significant differences in 2-year survival, 5-year recurrence-free survival (RFS), 5-year overall survival (OS), 2-year OS, and metastasis rates [2].

Parallel with our program recently, the single port-surgery or LESS surgery was developed whereby allowing to performing laparoscopic procedure with a single incision. View center through fiber-optic camera has been established using LESS, with single port-surgery and robotic procedure in recent years; thus, NOTEs approaches have been replaced by the aforementioned procedure. However, in this case report, we found NOTES approach for UTUC is surgically and oncologically safer thus, we recommend this procedure will be considered and investigated immediately in highly selective procedures.

Conclusion

In the current report, we have described our first experience using LNU with transvaginal extraction route to retrieve a kidney from the patient. The success rate of this surgery is highly dependent on the surgeon's experience, since this technique is considerably new and was considered acceptable despite the learning curve for the surgeon. Further studies with a larger sample and comparison of this technique with other approaches are needed.

Acknowledgment

The authors would like to thank Reza Yorghi JKS to provide scheme illustrations of port placement on this article.

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