

Single incision nephrectomy in an 8-year-old child using umbilical laparoendoscopic single-site surgery (U-LESS)

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Umbilical laparoendoscopic single-site surgery (U-LESS) is a relatively new technique for minimally invasive

surgery being implemented in patients with urological complaints. We report the case of an incontinent 8-year-old girl who successfully underwent U-LESS for nephrectomy of a minimally functioning kidney with ectopic ureteral insertion into the vagina.

Key Words: U-LESS, E-NOTES, minimally invasive surgery, nephrectomy, pediatrics

Overview

In recent years the practice of surgery has been revolutionized by the implementation of numerous minimally invasive techniques, which have significantly improved morbidity and cosmesis without sacrificing surgical efficacy. Among these recent developments is the natural orifice transluminal endoscopic surgery (NOTES)¹ technique, wherein the surgeon accesses the abdominal cavity without creating an abdominal wall incision, and umbilical laparoendoscopic single-site surgery (U-LESS),² which uses the preexisting umbilical scar as an alternative orifice to the same effect as NOTES.

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While U-LESS has been implemented effectively in a number of different adult urologic and non-urologic cases,³⁻⁵ use in the pediatric population has been limited.⁶ To our knowledge the following constitutes the first reported use of U-LESS for nephrectomy in a pediatric patient.

Case report

An 8-year-old African American female presented with a history of persistent urinary incontinence from birth. Family reported no difficulty in toilet training, urgency, posturing, or tendency to delay voiding. Ultrasound initially identified a 9.9 cm left solitary kidney without hydronephrosis as well as an unknown tubular structure in the right pelvis. Further work up with CT scan revealed a minimally functioning ectopic 4 cm right kidney with ectopic insertion of the right ureter directly into the vagina, Figure 1 and 2. Given the minimal contribution of the atrophic right kidney

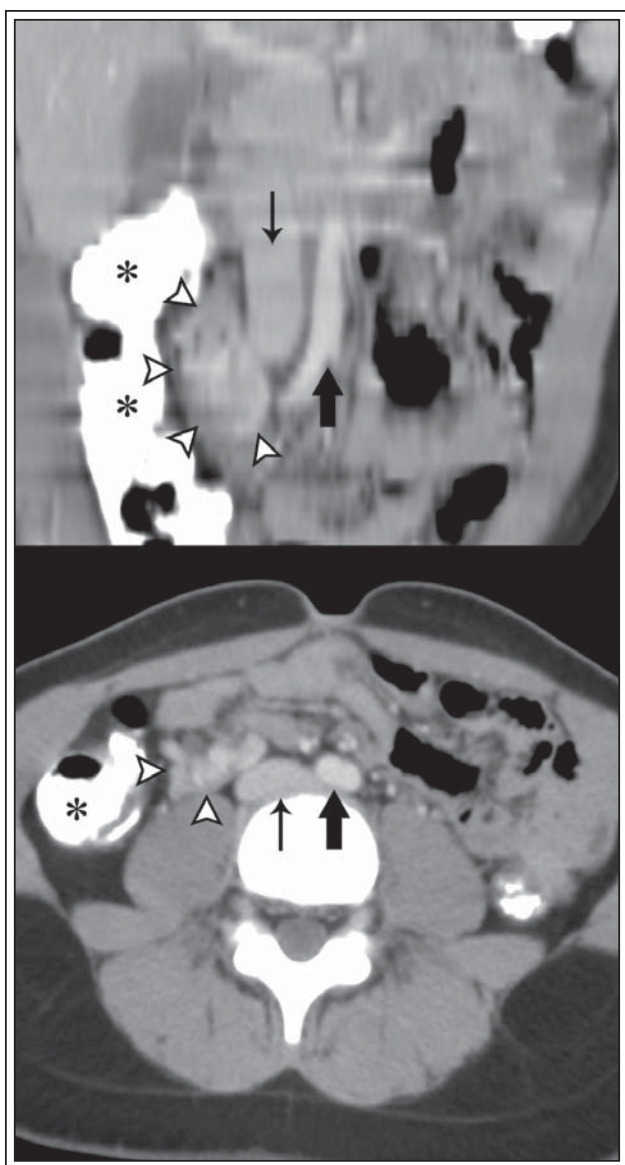


Figure 1. CT scan demonstrating ectopic right kidney. White arrowheads point to the ectopic right kidney. Note its location and size. Asterisk represents the enteric contrast within ascending colon. Thin black arrow shows the IVC. Thick black arrow shows the aorta and bifurcation.

to overall renal function, a right nephrectomy was recommended to the patient and her family as opposed to ureteral reimplantation or other reconstruction. U-LESS approach was used.

Following induction of general anesthesia, a Foley catheter was placed and the patient was placed in modified left lateral decubitus position. The operative area was draped, and a 2.5 cm curvilinear incision was made just right of the umbilicus. Pneumoperitoneum

was achieved by means of Veress needle placement. Three 5 mm trocars (two 100 mm and one 50 mm length) were placed, with the 50 mm trocar placed in the middle flanked by 100 mm trocars at the superior and inferior aspects of the wound. Instruments included a 5 mm HD flexitip laparoscope (Olympus, Center Valley, PA), flexible "RealHand" DeBakey grasper (Novare, Cupertino, CA), 5 mm Ligasure device (Valleylab, Boulder, CO), 5 mm Hem-o-lok applicator (Teleflex, Research Triangle Park, NC), as well as standard laparoscopic instruments.

After reflection of the right colon, the atrophic right kidney was completely exposed, and posterior dissection was performed using LigaSure and the RealHand grasper. The kidney was freed and elevated using the wristed grasper, allowing hook dissection to skeletonize the renal hilum. The renal artery and vein were visualized and controlled using Hem-o-lok clips. At this time, a second upper pole vessel was visualized and this was controlled in similar fashion. After blunt dissection of the inferior pole of the kidney the ureter was visualized coursing in the direction of the iliac artery, and was controlled with a Hem-o-lok clip and divided. The kidney was then entirely freed from any attachment, and excellent hemostasis was documented.

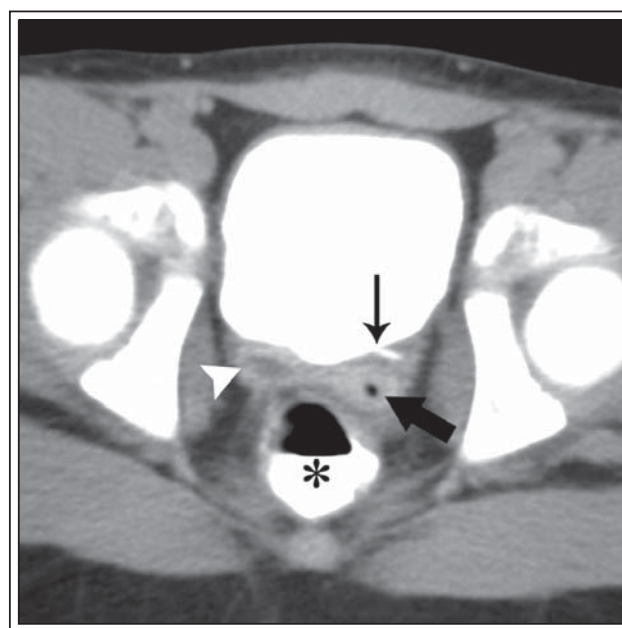


Figure 2. Delayed contrast CT demonstrating fluid filled vagina. White arrowhead points to fluid filled vagina. Thick black arrow points to the left aspect of the vagina containing a small amount of air. Thin black arrow shows normal left ureter inserting into bladder. Asterisk shows enteric contrast in rectum.

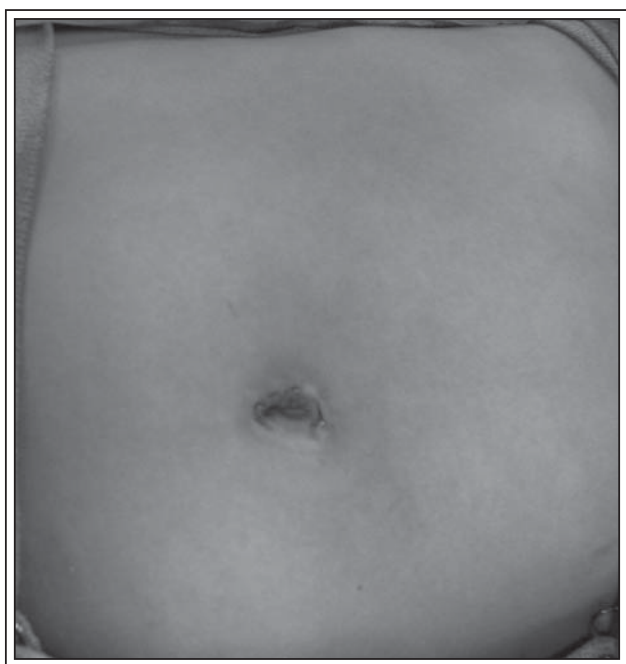


Figure 3. Postoperative umbilical incision.

One of the 5 mm trocars was removed, and a 10 mm trocar was introduced via the umbilical incision to allow a 10 mm EndoCatch bag entrance into the abdomen. The specimen was scooped into the bag under vision and removed. The fascia was closed with 2-0 vicryl, the skin closed with 4-0 monocryl, local anesthetic instilled, and the wound was dressed, Figure 3. Total operative time was 62 minutes from incision to skin closure. Estimated blood loss was 10 cc. The patient was discharged home in good condition on postoperative day 1.

At her follow up visit 4 days later, the patient reported having experienced minimal discomfort with no urine leakage. Both she and her mother were very satisfied with the surgical outcome.

Comment

The foregoing report describes the first documented nephrectomy by means of U-LESS in the pediatric population. This method entails its own unique dilemmas as a consequence of the small point of entry for instrumentation. These challenges include difficulty with appropriate visualization, instrument crowding, triangulation, and retraction, and have been addressed admirably by advances in technology and instrumentation. High definition and flexible tip endoscopes, flexible/wristed graspers, and use of fixation or sling sutures for retraction (either intra-abdominally or percutaneously) have greatly ameliorated these

difficulties,³ although a significant learning curve still exists for the surgeon unfamiliar with the technique.

Though still in the nascent stages of its development, U-LESS represents a novel and exciting new means of performing intra-abdominal surgery. Clear data comparing any relative benefit of U-LESS versus standard laparoscopic surgery do not yet exist. However, intuitive benefits of the technique include improved cosmesis and minimization of the number of ports involved in surgery, both of which have been studied, though not in this specific context. Thorough examination of the psychological effects of postsurgical scarring is not well defined, but Brown et al report a significant effect of postsurgical scarring on quality of life,⁷ and it seems likely that these effects might be even more pronounced in pediatric patients. Similarly, minimization of the number and size of ports used in laparoscopy has been shown to result in modest improvement in post-operative outcomes in terms of pain and recovery time.^{5,8-10} Prospective trial data are warranted to elucidate whatever benefit, if any, U-LESS holds over standard laparoscopic surgery. □

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