Laparoscopy and Robotics

Robotic Flexible Ureteroscopy: A Step-by-Step Video by Using Roboflex Avicenna Platform

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BACKGROUND The management of kidney stones, particularly those in the renal pelvis, is a critical aspect of urology. The European Association of Urology guidelines recommend Extracorporeal Shock Wave Lithotripsy or Endourology methods, encompassing Percutaneous Nephrolithotomy and Ureterorenoscopy (URS), for stones ranging from 10-20 mm. Robotic-assisted urological procedures have gained prominence in recent years, promising enhanced precision and safety.

OBJECTIVE To provide a detailed account of the technical aspects and outcomes of a robotic URS (robo-URS) procedure in a 63-year-old male patient with a 15-mm renal pelvis stone, serving as a reference for urologists considering this approach.

MATERIALS The patient presented with right flank pain, and an unenhanced computed tomography scan confirmed the presence of a 15 × 12 × 13 mm stone in the right renal pelvis. After assessment and preparation, robo-URS was performed using the Roboflex Avicenna robotic platform (ELMED, Ankara, Turkey) in conjunction with conventional urological instruments and laser technology.

RESULTS The procedure was completed successfully in 50 minutes without any detectable blood loss or intraoperative complications.

CONCLUSION Robo-URS is a promising approach for managing renal pelvis stones. The procedure, demonstrated in this video article, underscores its technical feasibility, safety, and efficacy, making it a valuable resource for urologists seeking to expand their knowledge in stone management techniques. UROLOGY xx: xxx–xxx, xxxx. © 2024 Elsevier Inc. All rights reserved.

According to the EAU guideline, extracorporeal shock wave lithotripsy (ESWL) or Endourology method (encompasses all percutaneus nephrolithotomy (PCNL) and Ureterorenoscopy (URS)) is recommended for 10-20 mm kidney stones in the renal pelvis.[1] Robotic-assisted endourological procedures have recently gained attention in the field of urology. Even though an ideal robot is still to come, we have performed this case with a safe, robust, and reliable robotic platform available on the market.[2] Here, we present the technical details of a 63-year-old male patient who underwent robotic URS (robo-URS).

Case Presentation

The patient was admitted to our clinic due to right flank pain. The unenhanced computed tomography on the patient revealed a 15 × 12 × 13 mm stone in the right renal pelvis. Robo-URS was preferred over conventional URS due to advantages in ergonomics, tremor reduction, surgeon fatigue, and comfort, assuming the indications and contraindications were the same. Despite the merits, the learning curve and financial implications pose relative handicaps.

The operation started in the lithotomy position with 9.5 F semi-rigid ureteroscopy (Olympus, Tokyo, Japan) under general anesthesia. After passive dilatation of the ureter, 2 hydrophilic guidewires (one for safety and the other for ureteral access sheath (UAS)) were placed in the renal pelvis. Then, a 10/12 F UAS was placed into the ureter. The Roboflex Avicenna (ELMED, Ankara, Turkey) robot was draped and docked to the UAS. A flexible fiberoptic ureteroscope (Karl Storz, Tuttlingen, Germany) was fixed to the robotic arm. The laser fiber was inserted through the 2 special adaptors which were fixed to the robotic handle. The irrigation line was attached to a special robotic system controlling the flow. The ureteroscopy was inserted through the UAS and the calculi were seen in the renal pelvis, and a 30-W laser device (Dornier MedTech GmbhH, Wessling, Germany) was used at 12 Hz, 0.8 J to dust the stone. A fragment to

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be removed for stone analyses was left in situ and no other residual fragments were seen on endoscopy and fluoroscopy. The robot was undocked. Basketing was performed for the left stone fragment. The robo-URS was completed by placing a 6 F JJ ureteral stent and 16 F urethral catheter.

RESULTS

The total operative time was 50 minutes, without detectable blood loss and there were no intraoperative complications. On the first postoperative day, the urinary catheter was removed, and the patient was discharged. Kidney-ureter-bladder radiography revealed that the JJ was in place and there were no residual calculi. JJ stent was removed on postoperative day 7.

CONCLUSION

In this video article, we demonstrated the technical details of robo-URS for kidney stones, offering a valuable resource for all urologists, with a particular focus on novices, while also presenting the initial visual presentation of robo-URS in a scientific journal.

Statement of Ethics

Written informed consent was obtained from the patient for publication of this case report and any accompanying images/videos.

Declaration of Competing Interest

The authors declare that they have no conflict of interest.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.urology.2024.03.012.

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