Asian Journal of Urology 10 (2023) 385–387

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/ajur

Editorial

Robotic surgery in urology: Recent advances

The adoption of robotic-assisted surgery has determined a paradigm shift in delivery of urological surgery in the last two decades. It has been a privilege for us to serve as guest editors for this special issue of the *Asian Journal of Urology* (*AJU*) on the most recent advances in this field.

Authors were identified as the opinion leaders in their super specialties and invited to contribute to this state-of-the-art special issue of the *AJU*. Topics were allocated with mutual consensus, spanning from robotic kidney and adrenal surgery to robotic pelvic and retroperitoneal surgery to the use of new platforms and technologies. This wide spectrum of topics is a testament of the large adaptation of the robotic platform and the ongoing commitment of these innovative surgeons who are constantly pushing the boundaries for better patient care.

Nephron-sparing surgery has exponentially increased with implementation of the robotics. Since its introduction in the clinical arena [1], robotic-assisted partial nephrectomy (RAPN) has become the *de facto* contemporary gold standard in this setting [2–4]. Urological surgeons have raised the barrier to include large (clinical tumor stages cT2-T3) tumors especially in solitary function kidney. In the latest review, Pandolfo et al. provide a critical analysis of the outcomes of RAPN for large tumors and challenging cases. These include tumors in solitary functioning kidney, completely endophytic, hilar, recurrent, and multiple renal tumors. As summarized in this review, the adoption of RAPN for these advanced indications is associated with favorable surgical, functional, and oncological outcomes. Before performing a RAPN procedure, preoperative surgical planning and intraoperative surgical navigation are key steps. In this respect, new technologies can assist the robotic surgeon in optimizing surgical planning and maximizing surgical safety [5,6]. Ghazi et al. present some exciting innovative work on the use of IRIS™ (Intuitive Surgical, Sunnyvale, CA, USA) as a surgical navigation platform during the execution of a RAPN procedure. The authors demonstrate a high degree of semblance between the preoperative surgical planning and intraoperative findings.

Robotic renal transplant surgery both for the donor and recipient has been widely adopted. Ruch et al. address the relevant question of whether the laterality of the donor kidney really matters. Their experience shows that robotic live donor nephrectomy can be safely performed, and implantation of robotically procured right renal allografts is not associated with higher risk of recipient complications.

Over the past decade, the role of robotic surgery for adrenalectomy procedure has increased [7–9]. Piramide et al. elegantly describe their robot-assisted adrenalectomy technique and outcomes at a high-volume robotic center. This can be a useful educational tool for those contemplating this procedure, and it also demonstrates that it can be safely performed even to tackle challenging adrenal masses. Several new multi-port robotic platforms have entered the clinical arena and they are likely to further expand the adoption of robotic surgical techniques across the globe [10]. Chen et al. describe a case of retroperitoneal RAPN with a new robotic system KD-SR-01. From China, Wang et al. report a prospective single-arm pilot study looking at feasibility and safety of single-site radical prostatectomy by using the SHURUI system (Beijing Surgerii Technology Co., Ltd., Beijing, China), another novel purpose-built robotic system.

From the conception of the da Vinci robotic platform, prostate robotic surgery has continuously increased and evolved. It still remains the largest robotic specialty and has exponentially been adapted by urologists [11–13]. Checcucci et al. present a feasibility study on the use of a new three-dimensional automatic augmented reality system guided by artificial intelligence in the identification of tumor proximity to the neurovascular bundle during nerve-sparing robot-assisted radical prostatectomy. Their prospective study suggests that nerve-sparing procedure is feasible in most patients even with locally advanced diseases.

As new robotic platforms are being introduced, even the well-established robotic radical prostatectomy procedure is evolving. The new single port (SP) daVinci™ platform

Peer review under responsibility of Tongji University.

https://doi.org/10.1016/j.ajur.2023.08.005

(Intuitive Surgical, Sunnyvale, CA, USA) was introduced only 4 years ago and only available in the US, Korea, and Japan [14]. Ramos-Carpinteyro et al. present the first 100 cases of transvesical SP robotic radical prostatectomy performed at the Cleveland Clinic, OH, USA. Reported outcomes are encouraging, with shorter length of hospital stay, opioid-free recovery, and quick return to urinary continence. This represents a novel anatomical approach to a "Retzius sparing" surgery concept by using this new technology. Another approach which has been "robotic-assisted" is that of perineal robotic-assisted radical prostatectomy [15]. Carbonara et al. reported intermediate-term oncological and functional outcomes during initial experience.

In the area of pelvic surgery, two contributions to this special issue are offered. The Mount Sinai group reports a comparative analysis of intracorporeal ileal conduit and neobladder urinary diversions in patients undergoing robotic-assisted radical cystectomy. These are interesting findings as the role of robotic surgery for bladder cancer treatment remains under scrutiny [16]. Another robotic system which has been recently introduced is the Hugo™ RAS system (Medtronic, Minneapolis, MN, USA) [10]. Investigators from Fundació Puigvert (Barcelona, Spain) report their initial single center experience using this new platform to perform robotic radical prostatectomy, both intra- and extra-peritoneally, and radical cystectomy with intracorporeal ileal conduit. Also here, initial results are promising.

Last, but not least, the role of robotic surgery for the management of testicular cancer has also been growing over the past few years, given the advantages of faster recovery in a generally younger patient population [17,18]. Franzese et al. present encouraging results of unilateral post-chemotherapy robot-assisted retroperitoneal lymph node dissection in Stage II non-seminoma testicular tumors at a tertiary care center in Italy.

In conclusion, we would like to sincerely thank the editors of the *AJU* for this opportunity, all the authors for their excellent papers, the reviewers for their precious work, and the *AJU* editorial team for their timely support. We are confident readers will enjoy this collection of fine contributions, and hopefully find some inspiration to further advance the field while better serving their patients.

Author contributions

Manuscript writing: Riccardo Autorino, Senthil Nathan.
Study concept and design: Riccardo Autorino, Senthil Nathan.
Supervision: Riccardo Autorino, Senthil Nathan.

Conflicts of interest

The authors declare no conflict of interest.

References

[1] Kaouk JH, Khalifeh A, Hillyer S, Haber GP, Stein RJ, Autorino R. Robot-assisted laparoscopic partial nephrectomy: step-by-step contemporary technique and surgical outcomes at a single high-volume institution. Eur Urol 2012;62:553—61.

[2] Carbonara U, Simone G, Capitanio U, Minervini A, Fiori C, Larcher A, et al. Robot-assisted partial nephrectomy: 7-year outcomes. Minerva Urol Nephrol 2021;73:540—3.

[3] Cerrato C, Patel D, Autorino R, Simone G, Yang B, Uzzo R, et al. Partial or radical nephrectomy for complex renal mass: a comparative analysis of oncological outcomes and complications from the ROSULA (Robotic Surgery for Large Renal Mass) Collaborative Group. World J Urol 2023;41:747—55.

[4] Beksac AT, Carbonara U, Abou Zeinab M, Meagher M, Hemal S, Tafuri A, et al. Redo robotic partial nephrectomy for recurrent renal tumors: a multi-institutional analysis. J Endourol 2022;36:1296—301.

[5] Puliatti S, Eissa A, Checcucci E, Piazza P, Amato M, Ferretti S, et al. New imaging technologies for robotic kidney cancer surgery. Asian J Urol 2022;9:253—62.

[6] Franco A, Amparore D, Porpiglia F, Autorino R. Augmented reality-guided robotic surgery: drilling down a giant leap into small steps. Eur Urol 2023;84:92—4.

[7] Brandao LF, Autorino R, Laydner H, Haber GP, Ouzaid I, De Sio M, et al. Robotic versus laparoscopic adrenalectomy: a systematic review and meta-analysis. Eur Urol 2014;65:1154—61.

[8] Brandao LF, Autorino R, Zargar H, Krishnan J, Laydner H, Akca O, et al. Robot-assisted laparoscopic adrenalectomy: step-by-step technique and comparative outcomes. Eur Urol 2014;66:898—905.

[9] Pavan N, Derweesh I, Rassweiler J, Challacombe B, Zargar H, Porter J, et al. Contemporary minimally invasive surgery for adrenal masses: it's not all about (pure) laparoscopy. BJU Int 2017;119:201—3.

[10] Salkowski M, Checcucci E, Chow AK, Rogers CC, Adbollah F, Liatsikos E, et al. New multiport robotic surgical systems: a comprehensive literature review of clinical outcomes in urology. Ther Adv Urol 2023;15:17562872231177781. https://doi.org/10.1177/17562872231177781.

[11] Sridhar AN, Abozaid M, Rajan P, Sooriakumaran P, Shaw G, Nathan S, et al. Surgical techniques to optimize early urinary continence recovery post robot assisted radical prostatectomy for prostate cancer. Curr Urol Rep 2017;18:71. https://doi.org/10.1007/s11934-017-0717-4.

[12] Carbonara U, Srinath M, Crocerossa F, Ferro M, Cantiello F, Lucarelli G, et al. Robot-assisted radical prostatectomy versus standard laparoscopic radical prostatectomy: an evidence-based analysis of comparative outcomes. World J Urol 2021;39:3721—32.

[13] Kumar A, Patel VR, Panaiyadiyan S, Seetharam Bhat KR, Moschovas MC, Nayak B. Nerve-sparing robot-assisted radical prostatectomy: current perspectives. Asian J Urol 2021;8:2—13.

[14] Franco A, Pellegrino AA, De Nunzio C, Salkowski M, Jackson JC, Zukowski LB, et al. Single-port robot-assisted radical prostatectomy: where do we stand? Curr Oncol 2023;30:4301—10.

[15] Akca O, Zargar H, Kaouk JH. Robotic surgery revives radical perineal prostatectomy. Eur Urol 2015;68:340—1.

[16] Catto JWF, Khetrapal P, Ricciardi F, Ambler G, Williams NR, Al-Hammouri T, et al. Effect of robot-assisted radical cystectomy with intracorporeal urinary diversion *vs.* open radical cystectomy on 90-day morbidity and mortality among patients with bladder cancer: a randomized clinical trial. JAMA 2022;327:2092–103.
[17] Mir MC, Autorino R, Samarasekera D, Klink J, Stephenson AJ, Kaouk JH. Robot-assisted laparoscopic retroperitoneal lymph node dissection for left clinical stage I non-seminomatous germ cell testicular cancer: focus on port placement and surgical technique. Int J Urol 2014;21:212–4.
[18] Rodrigues GJ, Guglielmetti GB, Orvieto M, Seetharam Bhat KR, Patel VR, Coelho RF. Robot-assisted retroperitoneal lymphadenectomy: the state of art. Asian J Urol 2021;8:27–37.

Riccardo Autorino*
Department of Urology, Rush University Medical Center, Chicago, IL, USA

Senthil Nathan
Department of Urology, University College Hospital London, London, UK

*Corresponding author.
E-mail address: riccardo_autorino@rush.edu (R. Autorino)

22 August 2023