ARAB JOURNAL OF UROLOGY
2025, VOL. 23, NO. 2, 152–159
https://doi.org/10.1080/20905998.2024.2442267

ORIGINAL ARTICLE

OPEN ACCESS Check for updates

Robot-assisted radical prostatectomy with the Versius surgical platform: An objective criticism and a guide for an optimal surgical setup

Mahmoud A. Abdelhakim and Mohamed Abdelwahab

Department of Urology, Kasralainy, Cairo University, Cairo, Egypt

ABSTRACT

Objectives: This was an observational study aiming at providing a guide for an optimal setup of the Versius robotic system and evaluating its performance in robot-assisted radical prostatectomy (RARP).

Patients and methods: Between July 2022 and December 2022, all patients with pathologically confirmed prostate cancer candidates for radical prostatectomy were included. Patients who had previous abdominal surgeries or were unfit for pneumoperitoneum were excluded. The preoperative, intraoperative, and postoperative data were prospectively collected. RARP was performed through 5 ports (12 mm); 3 for the robotic arms, 1 for the camera, and 1 for the assistant surgeon. Repeated adjustments of the patient's position and port distribution along with the bedside unit's configuration, arrangement, and orientation were made until an optimal setup was achieved. The technical malfunctions were identified in each case and fixed in the subsequent ones. All patients were invited to the follow-up clinic for routine visits on the first and second weeks following surgery and then every month for three months.

Results: Thirty patients underwent the procedure without conversion to laparoscopy or open surgery and abided by the follow-up regimen. The first nine cases required frequent setup adjustments due to recurring alarms and arms-related conflicts. Thenceforth, the mean docking time, console time, urethro-vesical anastomosis time, and total operative time were enhanced in the last 21 cases without system alarms. No major intraoperative complications related to the robotic system utilization were reported. The postoperative course of all participants passed uneventfully. The median length of the hospital stay and catheterization time were 2 (1–2) and 7 (7–10) days, respectively.

Conclusion: The Versius system offers a promising robotic platform with a flexible surgical setup. The proposed setup provides a guide for a smooth performance in RARP with minimal instruments' collision to eschew system failure. Being the first generation of this surgical robotic system, future efforts are still needed to improve its performance and minimize its drawbacks.

ARTICLE HISTORY
Received 10 September 2024
Accepted 8 December 2024

KEYWORDS
Robotic; radical prostatectomy; Versius surgical system; optimal setup

Introduction

Robotic-assisted radical prostatectomy (RARP) has recently become the gold standard for surgical treatment of prostate cancer in most specialized centers [1]. In the past two decades, the RARP technique has been refined to achieve the trifecta of a good oncological outcome together with speedy recovery of full continence and erectile function [2,3]. However, most of the data in the literature is based on RARP done using the Da Vinci platform. Recently, after the patent expiry of (Intuitive Surgical), new robotic systems have been introduced to the surgical field side by side with the Da Vinci system. These new systems need to adapt standardized surgical steps to reach the same goal [4].

The Cambridge Medical Robotics (CMR) Versius system is one of these robotic systems that has been approved in the UK in 2018 and received the European CE Mark in March 2019. This new platform is characterized by its flexibility, being multimodular with separate independent bedside units (BSUs). Each wristed instrument has a wide range of movement inside the patient, which is supported by a human-like flexible robotic arm [5,6]. This level of articulation provides flexibility in ports' placement, which is particularly advantageous for patients with different BMIs. On the other hand, it requires great attention and a good imagination of extra and intracorporeal movements of the bedside arms to better understand the ergonomics of the whole platform to eschew instruments' collisions and arms' clashes.

Although several studies reported the feasibility of using the CMR Versius platform in different surgical procedures and its implementation specifically in pelvic surgeries, including radical prostatectomy [7,8], there is no detailed description of the ideal setup of the Versius system to ensure smooth intraoperative performance without technical obstacles or system failure.

CONTACT Mohamed Abdelwahab m.abdelwahab@kasralainy.edu.eg Department of Urology, Kasralainy, Cairo University, 6 October City, 5th district, 6th Neighborhood, Building 1242, Cairo 12624, Egypt

Herein, we present our experience in achieving a standardized setup in RARP regarding the patients' position, ports' placement, and the configuration of the bedside units and to evaluate the performance of the CMR Versius robot, highlighting its strengths and weakness points.

Patients and methods

Between July 2022 and December 2022, all patients having pathologically confirmed prostate cancer candidates for radical prostatectomy were included in the study. Patients with previous abdominal surgery and those who were not fit for pneumoperitoneum were excluded. All surgeries were done by a single surgeon who had laparoscopic experience of more than 600 laparoscopic radical prostatectomies but with no previous robotic experience. RARP was performed on three cadavers prior to clinical practice as a part of CMR Versius training.

The research protocol and data collection were prospectively approved by the ethical committee and institutional review board (*N*-445-2023). A written consent was obtained from all participants.

Preoperative and demographic data were collected, including age and body mass index (BMI) in addition to prostate specific antigen (PSA), transrectal ultrasound findings regarding the prostate size and the biopsy Gleason score, as well as the PSMA PET CT scan and the multiparametric MRI findings for staging [9,10].

The operative details, including console time, operative time, urethrovesical anastomosis time, blood loss, and any intraoperative events, as well as the postoperative data, including hospital stay, catheter removal, and early outcomes regarding continence and convalescence, in addition to the postoperative pathology and the PSA level, were gathered prospectively. The urethral catheter was removed after 1 week postoperatively, and the serum PSA testing was performed after 3 months. Initially, erectile function data was not planned to be included due to the short follow-up plan of the study design.

Post-operative visits

The patients were postoperatively invited to regular visits in the 1st and 2nd week, then monthly for 3 months at the follow-up clinic to examine the port sites, to assess continence, and to manage any postoperative complaints. All patients were referred postoperatively to physiotherapy for pelvic floor muscle rehabilitation.

The total continence was defined as requiring no pads. Patients who used one safety pad per day were considered socially continent and were deemed continent whenever they were comfortable removing it.

The postoperative complications were categorized according to the Clavien Dindo scale [11].

Patient position, ports arrangement, system docking

The operative setup, including the patient's position, the ports' sites distribution, as well as the bedside unit's configuration, arrangement, and orientation, were modified and adjusted in the first 9 cases. The technical malfunctions were identified in each case and fixed in the subsequent ones until an optimum setup was settled and standardized in the rest of the cases.

Patients were positioned in a steep Trendelenburg position. After sterile dressing, a 16-Fr Foley's catheter was inserted into the bladder.

Abdomen insufflation was done using a Veress needle at Palmer's point. After reaching pneumoperitoneum, a 1 cm skin incision was made on the superior umbilical crease, and a 12 mm camera port was inserted under visual guidance. Inspection of the abdomen was done, followed by four ports' placement as follows:

A 12 mm port assigned to the bipolar forceps was placed handbreadth above the level of the symphysis pubis, 2 fingers medial to the left anterior superior iliac spine. The second one was the right 12 mm port assigned to monopolar scissors and was placed on the opposite side. A third 12 mm port assigned to the grasping forceps was placed 4 finger breadths above and lateral to the level of the left working port in the anterior axillary line, and the last 12 mm port assigned for the bedside assistant for suction and irrigation, as well as clips application, was placed at a mirror position to the third port. Both the third and the fourth ports are placed at the same level as the camera port. The ports' positions, as shown in Figure 1, were chosen carefully to allow the full range of movement of all instruments and swift process during all the operative steps.

Bedside units' arrangement and ergonomics

Three BSUs (U, D, and R) were used for 3 robotic instruments, in addition to the camera bedside unit (C).

The BSUs are arranged as follows

The first BSU to be placed was the U-bedside unit (U-B) (used for the grasper), which is placed 15 cm from the operative table opposite to the left hip joint. The height of this unit was brought to zero, and the orientation was standard (C shape). (Figure 2) The range of movement of this instrument is optimal in the abdomen when it is used to move

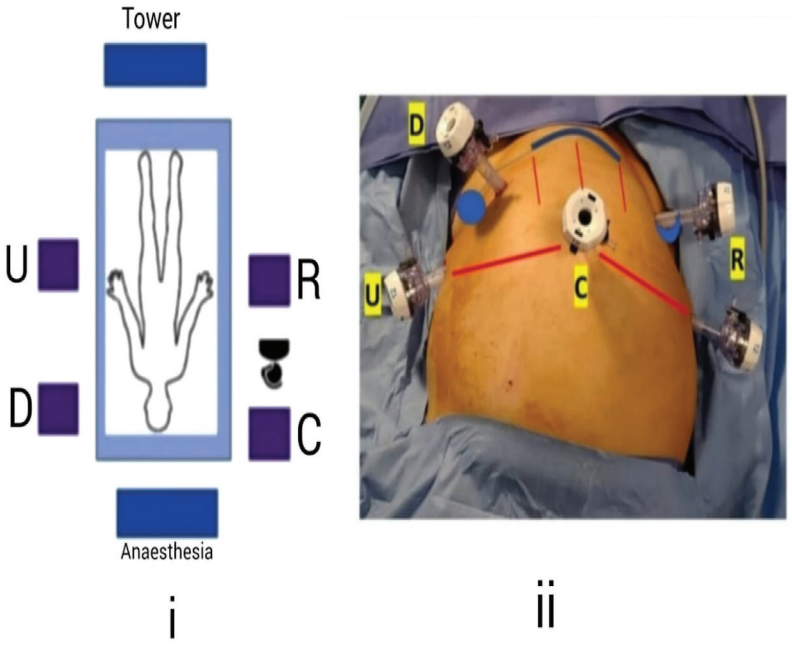

Figure 1. i) Diagram of bed side units' distribution. ii) Photo of ports' sites and distribution.

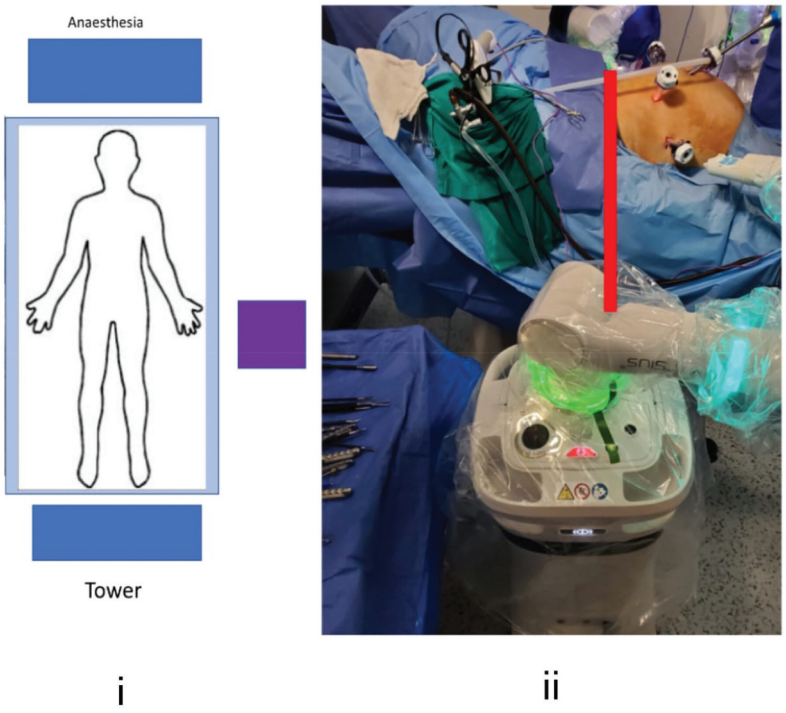

Figure 2. i) Diagram of (U-B) bed side unit position. ii) Photo of its distance and adjustment.

anteriorly towards the anterior abdominal wall and upwards towards the patient's head (hence named U-Up).

The second BSU was the D bedside unit (D-B) assigned for the bipolar forceps. This unit was placed 10 cm lateral to the (U-B) and opposite the patient's left shoulder. Its orientation is in the reverse position. The height was adjusted to be above the level of the first joint of the (U-B) (Figure 3). The range of movement of this instrument is optimal in the abdomen when it's used to move posteriorly towards the back of the patient and downwards towards the pelvis (hence named D-Down).

The right (R-B) unit was used for the scissors and is placed opposite to (U-B) and elevated to the level of the right port, whereas the camera C bedside unit is placed opposite to (D-B). Both were oriented in the standard C shape and had free mobility. (Figure 4)

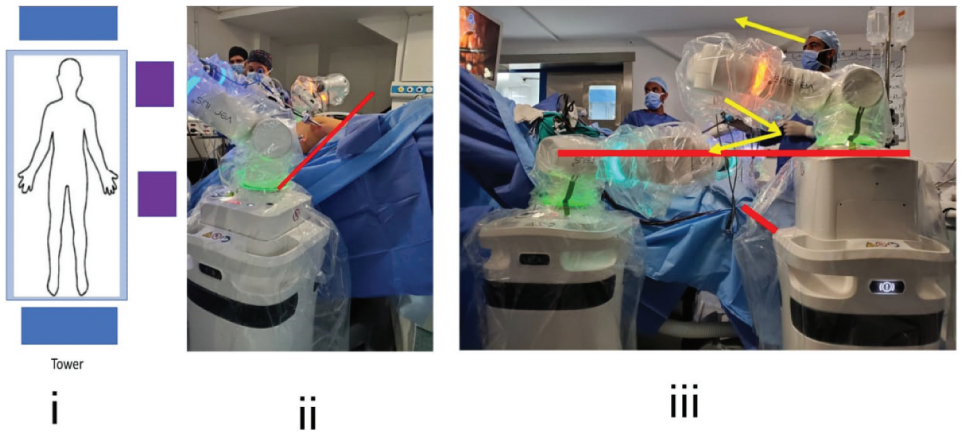

Figure 3. i) Diagram showing the (U& D) bedside units' position ii) photo of their distance and position in relation to the patient iii) photo of the bedside unit relation to the adjacent bedside unit as well as the configuration.

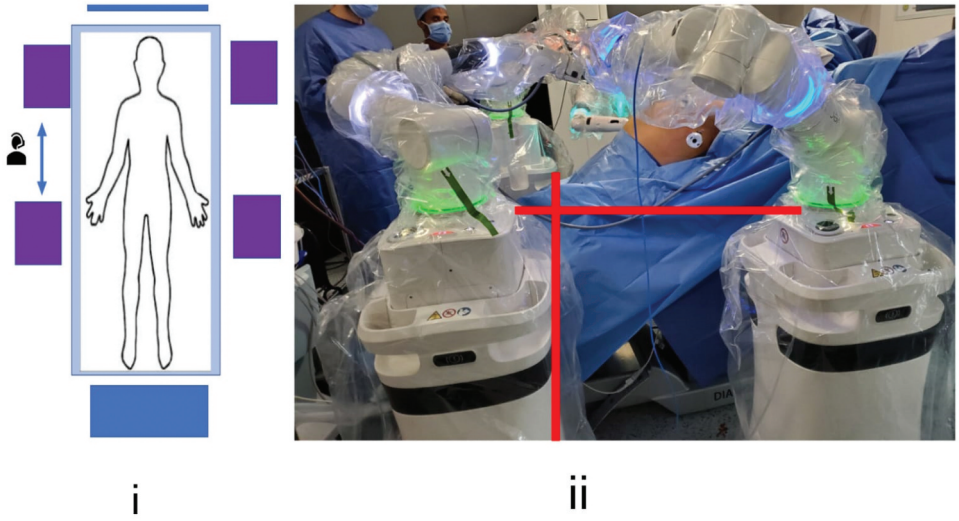

Figure 4. Camera and right bedside units; i) diagram showing the camera bedside unit position ii) photo of the relation between the camera (C) and right (R) bedside units.

Operative technique

All cases were done through a transperitoneal approach, starting with posterior dissection of the vas deferens (VD) and the seminal vesicles (SV). Bladder drop was then done, allowing an anterior approach for bladder neck dissection and control of the deep dorsal vein complex. Nerve-sparing was done for those who had organ-confined localized prostate cancer, excluding those with locally advanced disease and those with posterior adhesions hindering proper dissection of the neurovascular bundles without using energy devices. Extended pelvic lymph node dissection (internal, external, and obturator) was performed in intermediate- and high-risk patients. (PSA >10 ng/ml, Gleason score > 3 + 3 or c T stage > T2a).

For the sake of full functioning urethral sphincter preservation, thereby assisting early sphincteric recovery, certain anatomical structures were preserved. The puboprostatic ligaments, arcus tendinous, endopelvic fascia, Santorini plexus, neurovascular bundles, Denonvilliers fascia, and pelvic floor levator ani were advisedly dissected, hence spared whenever feasible. Posterior anchoring of the fascial plate and bladder neck preservation were also uniformly done whenever attainable.

The vesicourethral anastomosis was done using two 3-O barbed sutures (V-Loc, Covidien, Mansfield, MA) starting at 6 o'clock towards the 12 o'clock bilaterally in a running fashion.

A 20-fr silicone catheter was then inserted. The specimen was retrieved through the second port site incision, and the incision as well as the other ports' sites were closed.

Statistical analysis

The collected data were analyzed using the statistics software SPSS version 26 (Statistical Package for the Social Sciences, IBM Corp.). Quantitative variables were described as mean ± SD and median (range), while

Table 1. Preoperative details and demographic data.

	Median	MIN	MAX
Age (years)	67	52	72
BMI (kg/m [2]	29.73	23.78	38.75
Prostate size (gms)	33.131	20	150
Preoperative PSA (ng/ml)	5.7	2	27

qualitative variables were described as count and percentage. The distribution of the data was analyzed by the Kolmogorov-Smirnov test. A Wilcoxon Signed Ranks Test was done to compare the means of related variables (PSA), and a P-value <0.05 is considered statistically significant.

Results

Between July 2022 and December 2022, a total of 30 consecutive patients underwent robotic radical prostatectomy using the CMR Versius system. One patient received neoadjuvant hormonal therapy before attending our institute. All cases were successfully completed with no conversion to open or laparoscopic surgery. The preoperative and demographic data are presented in Table 1.

In the first 4 cases, repeated alarms were encountered because of the arms clashes. This required repeated changes of ports' sites and the need for ports' retraining, which led to increasing the time required for system setup and, hence, increasing the total operative time. Repeated modifications were done to reach the best surgical setup in the next 5 cases.

The mean docking time, console time, urethrovesical anastomosis time, and total operative time were enhanced after the first 9 cases (detailed data are presented in Table 2).

System alarms occurred in the median of 2 (1–4) times in the first 9 cases. Most of the alarms were minor. High-priority alarms occurred three times in the first four cases, which required changes in ports' sites and ports' retraining. In the last 21 cases, no system alarms occurred.

The mean time for specimen extraction and wound closure was 11.37 ± 1.691 minutes in all cases. The mean blood loss was 231.67 ± 50.11 ml, and one patient needed an intraoperative blood transfusion. No postoperative blood transfusion was required in all cases. Nerve-sparing was done in 20 patients (66.67%); unilateral in 2 patients (6.67%); and bilateral nerve-sparing in 18 patients (60%). Lymphadenectomy was done in 25 patients (83.3%). The median hospital stay was 2 (1–2) days. In all cases, postoperative courses passed uneventfully. No major complications of Clavien-Dindo grade > grade II related to the robotic system utilization were reported.

The median time for catheter removal was 7 (7–10) days. Positive surgical margins were found in 2 patients (6.67%). Histopathological results and T&N staging are presented in Table 3. Postoperative PSA was undetectable in 28 patients (93.33%) and remained high in 2 patients (6.67%) after 3 months. The regain of postoperative continence in the current study improved gradually during the follow-up visits.

Table 2. Operative parameters in the first 9 and the last 21 cases.

	1St nine patients			last 21 cases			
	Median	Min	Max	Median	Min	Max	P-value*
Docking Time (mins)	15.00	12	17	10.00	7	12	<0.001
Operative Time (mins)	179.00	163	195	153.00	140	165	<0.001
Console Time (mins)	160.00	140	170	130.00	120	145	<0.001
Urethrovesical Anastomosis Time (min)	26.00	20	29	24.00	20	29	0.086
No. of alarms	2.00	1	4	0.00	0	0	<0.001

Table 3. Gleason score and (T& N) staging.

		Pre operative	Post operative
Gleason-Score; n (%)	• 3 + 3	6 (20%)	4 (13.33%)
	• 3 + 4	14 (46.7%)	18 (60%)
	• 4 + 3	6 (20%)	6 (20%)
	• 4 + 4	4 (13.3%)	1 (3.33%)
	• 4 + 5	0 (0%)	1 (3.33%)
T staging; n (%)		**Clinical**	**Pathological**
	• T1b	1 (3.3%)	0 (0%)
	• T1c	9 (30%)	0 (0%)
	• T2a	8 (26.7%)	12 (40%)
	• T2b	10 (33.3%)	10 (33.3%)
	• T2c	1 (3.3%)	6 (20%)
	• T3a	0 (0%)	1 (3.3%)
	• T3b	1 (3.3%)	1 (3.3%)
N staging; n (%)		**Clinical**	**Pathological**
	• Nx	0 (0%)	5 (16.67%)
	• N0	29 (96.7%)	23 (76.67%)
	• N1	1 (3.3%)	2 (6.67%)

Table 4. Postoperative continence recovery.

1 week Post Catheter Removal Continence; n (%)	
Total continence	5 (16.67%)
Social continence	8 (26.67%)
Mixed stress and urgency incontinence	17 (56.67%)
1st month postoperative Continence; n (%)	
Total continence	9 (30%)
Social continence	13 (43.33%)
Stress incontinence	5 (16.67%)
Predominant urgency incontinence	3 (10%)
2nd month postoperative Continence; n (%)	
Total continence	18 (60%)
Social continence	7 (23.33%)
Stress incontinence	5 (16.67%)
3rd month postoperative Continence; n (%)	
Total continence	27 (90%)
Social continence	2 (6.67%)
Stress incontinence	1 (3.3%)

Details of postoperative regain of continence are presented in Table 4.

Discussion

Although newly introduced, the Versius robotic system is promising in accomplishing an efficient and safe RARP. Sparse studies reported on the implementation of the CMR system in prostate surgeries [7,8].

However, there is no sufficient data regarding an optimum or standardized setup of the operating system to achieve intraoperative harmony of the operating units to avoid system failure.

In our early cases, we faced technical obstacles while using this robotic system as regards the ergonomics and the ideal setup. Preoperative planning of ports' sites and distancing, as well as BSUs' arrangement and configuration, were important to avoid instruments' collision and the subsequent alarms that were disappointing and time-consuming.

Because of these bothersome events in the first 4 cases, we were compelled to use 2 working arms only, dispensing the third arm used for retraction. Although this gave a wider range of free movement of the main working arms, we lost the benefit of retraction assigned to this third BSU.

With careful observation of the intra- and extracorporeal arms' movement, a proper setup of the working platform was achieved. Another 4 to 5 cases were needed to reach the best configuration and precise places of the ports as well as the optimum position of the bedside units regarding their distance from each other and the operation table, their heights and orientations, as well as the direction and range of movement assigned to each unit. In such a way, a wide extracorporeal range for free movements of the bedside arms was gained without unwanted clashes, in addition to a wider intracorporeal room for the surgical instruments without collision. This configuration also allowed adequate working space for the assistant surgeon.

It is to be noted that this configuration is flexible and can be easily modified according to the stature of each case individually and according to the preference of other teams to suit their practice.

Along the same path, De Maria et al. reported on their RARP series done by the CMR platform, including 18 patients. They described their vision for the ideal setup as regards ports' sites and BSUs configuration [12].

A retrospective study on 58 RARPs using the Versius system was conducted by Polom W and Matuszewski M. They presented their opinion on the possible setup for radical prostatectomy. They described the patients' position, ports' distribution, and BSUs distribution and configuration [13].

Sighinolfi et al. also described their approach to pelvic surgeries and included 22 RARP cases in their study [14].

Although many studies addressed the surgical setup of the Versius platform, the current study is unique in its meticulous description of every single detail in the operating room setup with a precise description of ports' distribution, specific assignments for each robotic arm, and its range of movement in addition to the optimum distribution of the BSUs, their configuration, and their distance in relation to each other as well as to the operation table.

Regarding the surgical steps, our technique depended on the previous experience in laparoscopic radical prostatectomy mimicking the surgical steps and respecting the oncological principles in addition to making benefit of the 3-D vision, the articulating instruments, and the generous degrees of movement that reached precise anatomical sites that were difficult to reach with the conventional laparoscopy.

With the aid of stereoscopic vision and flexible instruments, it was easier to identify the precise planes, thus facilitating anatomical dissection. The articulating instruments also provide a generous range of movement, facilitating the suturing steps and vesicourethral anastomosis.

Among the interesting features of this novel system is the open console, which facilitates team communication and gives the opportunity to other observers to enjoy the stereoscopic vision while following the procedure.

It is worth mentioning that the surgeon's position is comfortable, allowing sitting on a freely adjustable seat in an upright position with no need for neck flexion. Also, the height of the console is adjustable to individually suit every surgeon. The visualization system is designed to serve both the robotic and the conventional laparoscopy. This is advantageous in case there is a need to convert from robotic assisted to traditional laparoscopy. Another interesting feature that facilitates the control of this system is the exclusive handgrip controller regulating the energy supply

and controlling the robotic arms and instruments' movements without pedal control.

Concerning the potential disadvantages of this platform, some could argue about the complex and time-consuming procedure of the BSUs' arrangement, docking, and ports' training. However, with gaining experience, the system setup became a simple process. During dry laboratory sessions, our surgical team was properly trained to turn on the system in a timely manner. In clinical practice, following the general principles and a few tips can speed up the docking procedure.

One of the main disadvantages identified is the short instruments (30 cm) of this device, which represented an obstacle in the early cases, hindering the reach of the target anatomy. This was managed by a slight modification of the ports' sites.

Another technical issue in the optics of this system is that the operating lens and the camera head rotate as one unit, resulting in the loss of direction orientation while trying to rotate the lens. In addition, unlike the Da Vinci robot, the 30-degree lens needs to be disconnected, rotated, and reconnected again in case there is a need to shift from a 30-up to a 30-down view and vice versa.

The lack of haptic feedback is a drawback in most robotic systems. This makes the surgeons rely on the image displayed on the screen only. However, the stereoscopic vision offered by this system helps to some extent to bridge this gap.

Several shortfalls need to be managed by the biomedical engineering team, mainly the lack of available accessories like vessel sealers and the lack of supporting imaging devices like the TilePro function of the da Vinci Surgical System.

The Versius robotic system is one of the newly introduced robotic systems that joined the surgical field. These novel robotic competitors have emerged after the patent expiry of Intuitive Surgical in an attempt to reduce costs and improve access to robotic surgery [4].

Of these new robots is the Hugo RAS system (Medtronic, Minneapolis, MN). The system has recently received CE (Conformitè Europëenne) Mark approval for gynecological and urological procedures in adults. Carlo et al. studied the safety and feasibility of RARP with the Hugo RAS system and described their optimal surgical setup of the robotic platform. The results were promising in terms of the surgical procedure and the early recovery of urinary continence [15].

Another novel platform is the Kang Duo Surgical Robot-01 platform. This is a 'master-slave' system that was recently developed in China. In 2023, Fan Shubo et al. compared the safety and efficacy of performing RARP using the Kang Duo surgical robot system to the da Vinci Si robotic system in clinically localized prostate cancer. Results were comparable as regards short-term functional and oncological outcomes. The main disadvantage was the longer operation time with the Kang Duo surgical robot system [16].

A limitation of the current study is the short-term follow-up with no detailed evaluation of the functional (erectile) and oncological outcomes after radical prostatectomy. However, the presented data was sufficient to serve the main aim of the study.

Future studies on larger cohorts with more detailed parameters and longer follow-up periods are needed to validate and experiment with this system and to assess the long-term functional and oncological outcomes of RARP using this platform. Until further investigations are available, our study provides guiding data on which future studies can depend.

Conclusion

The CMR Versius system offers a promising robotic platform with a flexible surgical setup that can be easily modified to suit the practice of different surgical teams. The proposed surgical setup offers a feasible manual for a smooth performance of this platform in RARP with minimal instruments' collision to eschew system failure. Although many shortfalls exist in this novel system, its performance is satisfactory, being the first generation of this robot that still has a long way towards improving its performance and minimizing its drawbacks.

Acknowledgments

Special thanks to Dr. Mohamed Abdel Ghany at the urology department, Kasralainy, Cairo University, for his contribution to the administrative paperwork.

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

Mohamed Abdelwahab http://orcid.org/0000-0003-0597-5643

Authors' contributions

All authors contributed to data analysis, drafting, or revising the article, gave final approval of the version to be published, and agreed to be accountable for all aspects of the work.

Availability of data and materials

Will be provided upon request.

Consent to publish

All authors have provided consent to publish.

Ethics approval and consent to participate

The research protocol and data collection were done under review of the institutional board and ethical committee of Kasralainy Hospital. The patients were counseled about the study, and written informed consent was obtained before participation.

Abbreviations

RARP	Robotic-assisted radical prostatectomy
CMR	Cambridge Medical Robotics
CE	Conformitè Europëenne
BSU	Bedside unit
BMI	Body mass index
PSA	Prostate-specific antigen
PSMA PET scan	Prostate Specific Membrane Antigen Positron Emission Tomography
MRI	Magnetic resonance imaging
RAS	Robotic-assisted surgery
VD	Vas Deferens
SV	Seminal Vesicles
FDA	Food and Drug Administration

References

[1] Lowrance WT, Eastham JA, Savage C, et al. Contemporary open and robotic radical prostatectomy practice patterns among urologists in the United States. J Urol. 2012;187(6):2087–2092. doi: 10.1016/j.juro.2012.01.061

[2] Nyberg M, Hugosson J, Wiklund P, et al. Functional and oncologic outcomes between open and robotic radical prostatectomy at 24-month follow-up in the Swedish LAPPRO trial. Eur Urol Oncol. 2018;1(5):353–360. doi: 10.1016/j.euo.2018.04.012

[3] Salomon L, Saint F, Anastasiadis AG, et al. Combined reporting of cancer control and functional results of radical prostatectomy. Eur Urol [Internet]. 2003 [cited 2024 Jul 2];44(6):656–660. Available from: https://pubmed.ncbi.nlm.nih.gov/14644116/

[4] Rao PP. Robotic surgery: new robots and finally some real competition! World J Urol [Internet]. 2018;36(4):537–541. doi: 10.1007/s00345-018-2213-y

[5] Haig F, Medeiros ACB, Chitty K, et al. Usability assessment of Versius, a new robot-assisted surgical device for use in minimal access surgery. BMJ Surg Interv Health Technol. 2020;2(1):e000028. doi: 10.1136/bmjsit-2019-000028 e Collection 2020.

[6] Thomas BC, Slack M, Hussain M, et al. Preclinical evaluation of the Versius surgical system, a new robot-assisted surgical device for use in minimal access renal and prostate surgery. Eur Urol Focus. 2021;7(2):444–452. doi: 10.1016/j.euf.2020.01.011

[7] Hussein AA, Mohsin R, Qureshi H, et al. Transition from da Vinci to versius robotic surgical system: initial experience and outcomes of over 100 consecutive procedures. J Robot Surg. 2023;17(2):419–426. doi: 10.1007/s11701-022-01422-9

[8] Rocco B, Turri F, Sangalli M, et al. Robot-assisted radical prostatectomy with the versius robotic surgical system: first description of a clinical case. Eur Urol Open Sci. 2023;48:82–83. doi: 10.1016/j.euros.2022.11.019

[9] Meijer D, van Leeuwen PJ, Roberts MJ, et al. External validation and addition of prostate-specific membrane antigen positron emission tomography to the most frequently used nomograms for the prediction of pelvic lymph-node metastases: an international multicenter study. Eur Urol. 2021;80(2):234–242. doi: 10.1016/j.eururo.2021.05.006 Epub 2021 May 21. PMID: 34024652.

[10] Gandaglia G, Ploussard G, Valerio M, et al. A novel nomogram to identify candidates for extended pelvic lymph node dissection among patients with clinically localized prostate cancer diagnosed with magnetic resonance imaging-targeted and systematic biopsies. Eur Urol [Internet]. 2019 Mar 1 [cited 2024 Jul 2];75(3):506–514. Available from: http://www.europeanurology.com/article/S030228381830753X/fulltext

[11] Clavien PA, Barkun J, De Oliveira ML, et al. The Clavien-Dindo classification of surgical complications: five-year experience. Ann Surg [Internet]. 2009 Aug [cited 2024 Jul 2];250(2):187–196. Available from: https://pubmed.ncbi.nlm.nih.gov/19638912/

[12] De Maria M, Meneghetti I, Mosillo L, et al. Versius robotic surgical system: case series of 18 robot-assisted radical prostatectomies. BJU Int. 2024;133(2):197–205. doi: 10.1111/bju.16156 Epub 2023 Aug 30. PMID: 37604773.

[13] Polom W, Matuszewski M. Initial experience of the Versius robotic system in robot-assisted radical prostatectomy: a study of 58 cases. Cent European J Urol. 2024;77(1):30–36. doi: 10.5173/ceju.2023.241 Epub 2024 Jan 8. PMID: 38645822; PMCID: PMC11032037.

[14] Sighinolfi MC, De Maria M, Meneghetti I, et al. The use of versius CMR for pelvic surgery: a multicentric analysis of surgical setup and early outcomes. World J Urol. 2024;42(1):31. doi: 10.1007/s00345-023-04730-3 PMID: 38217724; PMCID: PMC10787883.

[15] Bravi CA, Paciotti M, Balestrazzi E, et al. Outcomes of robot-assisted radical prostatectomy with the Hugo RAS surgical system: initial experience at a high-volume robotic center. Eur Urol Focus. 2023;9(4):642–644. doi: 10.1016/j.euf.2023.01.008

[16] Fan S, Hao H, Chen S, et al. Robot-assisted laparoscopic radical prostatectomy using the Kang duo surgical robot system vs. The Da Vinci Si Robotic system. J Endourol. 2023;37(5):568–574. doi: 10.1089/end.2022.0739