SHORT COMMUNICATION

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Feasibility and early outcomes of robotic sacrocolpopexy with the Versius® platform: a prospective single-centre experience

Giovanni Panico[1], Davide Arrigo[2], Camilla Riccetti[2], Sara Mastrovito[1], Alfredo Ercoli[3], Anna Fagotti[2], Francesco Fanfani[2]

[1]Department of Woman, Child and Public Health, Fondazione Policlinico Universitario A. Gemelli IRCCS, Rome, Italy
[2]Department of Woman, Child and Public Health, Fondazione Policlinico Universitario A. Gemelli IRCCS, Università Cattolica del Sacro Cuore, Rome, Italy
[3]Department of Human Pathology of Adults and Developmental, Unit of Gynecology and Obstetrics, University Hospital "G. Martino", Messina, Italy

ABSTRACT

Minimally invasive sacrocolpopexy is considered the reference procedure for pelvic organ prolapse (POP). This study reports the first series of robotic sacrocolpopexy (RSCP) performed with the Versius® Robotic Surgical System (CMR Surgical, Cambridge, UK). Twenty women with symptomatic multicompartment POP underwent nerve-sparing RSCP. All procedures were completed successfully with no complications or conversions. Surgical and functional outcomes were consistent with those reported for other minimally invasive techniques. At three-month follow-up, complete anatomical correction was achieved in 90% of patients, with improvement in patient-reported outcomes. Our experience indicates that the Versius® system is a safe and practical option for RSCP.

Keywords: Patient-reported outcomes, pelvic organ prolapse, reconstructive surgery, robotic, robotic surgery

Introduction

Over recent decades, advances in surgical technology have supported the expansion of robot-assisted surgery (RAS), aiming to improve operative feasibility, reduce invasiveness, and facilitate the surgical learning curve.[1] In gynaecology, several robotic systems have been introduced, and their use in urogynaecology procedures has grown steadily, particularly for the management of pelvic organ prolapse (POP).[2]

Sacrocolpopexy performed either laparoscopically (laparoscopic sacrocolpopexy) or robotically [robotic sacrocolpopexy (RSCP)] is considered the gold standard treatment for apical POP, offering high anatomical success, durable functional outcomes, and reduced recurrence when compared with other approaches.[3-6] Multiple robotic platforms have become available in recent years and our group has previously reported experiences using both the Senhance® System (TransEnterix Inc., USA) and the Hugo™ RAS platform (Medtronic, Minneapolis, MN, USA) for RSCP.[7-9]

The Versius® Surgical System (CMR Surgical, Cambridge, UK) received Conformité Européenne (CE) approval in 2019. This system is composed of

Corresponding Author: Giovanni Panico, MD, Department of Woman, Child and Public Health, Fondazione Policlinico Universitario A. Gemelli IRCCS, Rome, Italy
E-mail: drgiovannipanico@gmail.com **ORCID ID:** orcid.org/0000-0001-5473-9503
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three or four independent bedside units with fully wristed instruments to enhance surgical flexibility. The surgeon operates from an open console with hand controllers, enhancing comfort and team communication, with three-dimensional high-definition vision available in either a seated or standing position. Early clinical reports have shown promising outcomes across various surgical specialities.[10]

Here, we present the first series of nerve-sparing RSCP performed with the Versius® robotic platform, with a focus on feasibility and efficiency.

Methods

This prospective, single-centre study includes the first twenty consecutive women with symptomatic multicompartment POP stage ≥III [according to the International Continence Society Pelvic Organ Prolapse Quantification (ICS POP-Q) classification] who underwent nerve-sparing RSCP using the Versius® Surgical System (CMR Surgical, Cambridge, UK) at Fondazione Policlinico Universitario A. Gemelli IRCCS, Rome, Italy, between May and December 2024.

Demographic variables and baseline clinical characteristics were collected for each participant.

Preoperative assessment included medical history and pelvic examination (POP-Q, stress test, Q-tip test, and PC test for pubococcygeus strength). Additional investigations consisted of routine laboratory tests, pelvic and urinary tract ultrasonography, and cervical cytology. Hysteroscopy was performed when endometrial thickening was identified. Urodynamic evaluation was routinely carried out according to institutional protocol to detect occult dysfunctions and support surgical planning, even in asymptomatic patients. Data collection and reporting adhered to the ICS/International Urogynecological Association recommendations.

All patients were counselled on surgical alternatives, including prosthetic and native tissue repairs, risks and potential complications, and provided written informed consent for the procedure and anonymised data use. Concomitant supracervical hysterectomy was performed to standardise the technique, preserve the integrity of the precervical ring, and minimise the risk of vaginal contamination, while also facilitating secure mesh fixation. Salpingectomy or salpingo-oophorectomy was added according to age and menopausal status. All procedures were performed by a single experienced surgeon (GP) who performs over 50 minimally invasive sacrocolpopexies annually, using a lightweight, macroporous polypropylene mesh (Restorelle®, Coloplast, USA). Contained in-bag morcellation was performed in all cases.

Intraoperative and postoperative parameters were recorded prospectively. Docking time referred to robotic unit positioning, and operative time (OT) to the interval from skin incision to closure; console time indicated the duration at the surgeon's console. Intraoperative complications included visceral or vascular injury, blood loss >500 mL, transfusion, or unexpected events. Postoperative complications within 30 days were classified according to Clavien–Dindo. Pain at 24 hours was assessed using a visual analogue scale (VAS), and length of stay was calculated from the first postoperative day to discharge.

Categorical variables were reported as frequencies and percentages, and continuous variables as medians with ranges. Analyses were performed using SPSS (SPSS Inc., Chicago, IL, USA).

Port Placement and Surgical Procedure

The procedure was performed with the Versius® robotic system following a standardised technique previously described by our group.[8,9,11]

After positioning the bedside unit, trans-umbilical open laparoscopic access is obtained, and a 10-mm port for the 3D-HD 0° scope (Richard Wolf®, Knittlingen, Germany) is inserted. Two additional 5-mm ports are placed in the right and left lower abdomen, and an additional 5-mm trocar is placed at Palmer's point for first assistant's use. A three-arm robotic configuration was used in all cases. The port placement and the setting of the mobile bedside units are illustrated in Figure 1.

Robotic instruments used included monopolar scissors, bipolar grasper, and two needle holders. Dissection was performed using monopolar scissors on the right hand and bipolar graspers on the left, while two needle drivers were used for mesh fixation. Through the accessory port, the assistant utilised graspers, a clip applier, and a suction-irrigation device.

The supplementary video demonstrates the features of the robotic platform and the key surgical steps.

Results

A total of 20 women with symptomatic multicompartment POP were included. The median age was 52.5 years (range 41-76), with a median body mass index (BMI) of

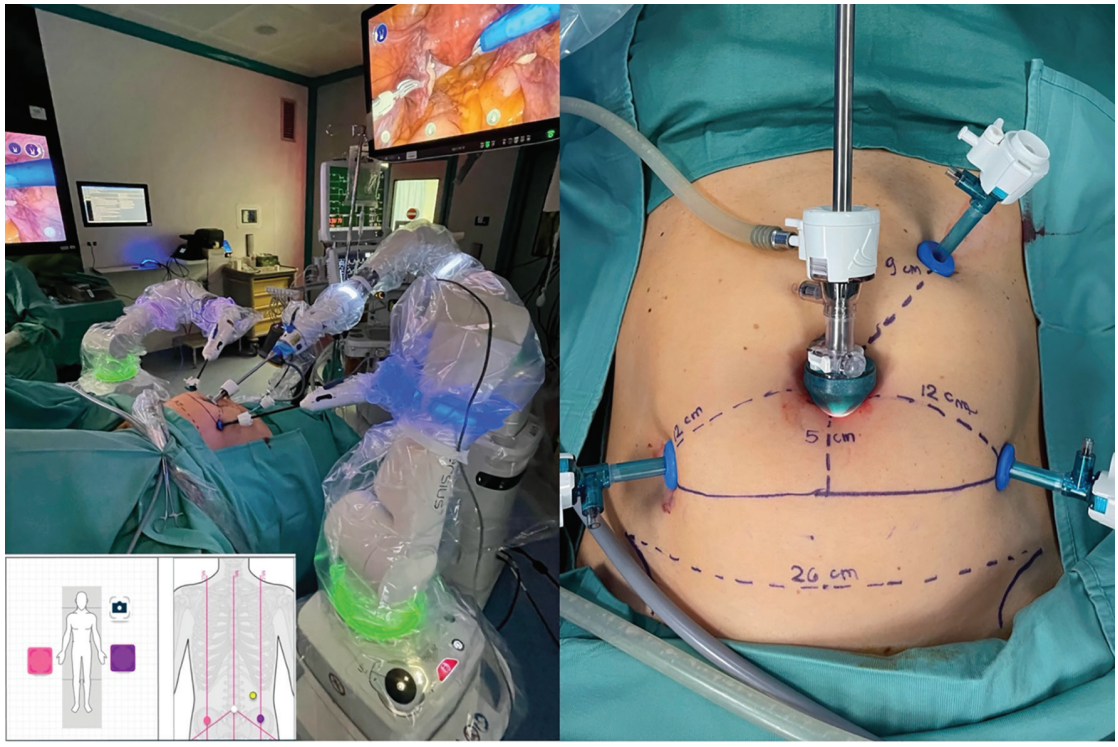

Figure 1. Detail on setting of the robotic mobile bedside units and port placement.

21 kg/m² (range 20-30), and a median parity of 2 (range 1-4). Eighteen women (90%) were postmenopausal, and two (10%) were premenopausal. Ten patients (50%) had a history of previous abdominal surgery (laparotomic or laparoscopic), and two (10%) had previously undergone prolapse repair. No patient had a prior hysterectomy or a previous caesarean section. Preoperative POP-Q evaluation showed stage III prolapse in 16 patients (80%) and stage IV in 4 patients (20%). The anterior compartment was the most affected (median stage 3, range 2-3), followed by the apical compartment (median stage 3, range 2-4), and the posterior compartment (median stage 1, range 0-2). As part of the diagnostic work-up, all patients underwent pelvic ultrasonography. Pelvic magnetic resonance imaging and hysteroscopy were performed when clinically indicated (2 cases each, 10%).

Perioperative data and surgical outcomes are summarised in Table 1. The median OT was 174 min (range 146-229). The median docking time was 4 min (range 2-12). Median estimated blood loss was 20 mL (range 10-100). Tjere were no conversions to laparoscopy or laparotomy. All patients had associated subtotal hysterectomies with bilateral salpingectomy/salpingo-oophorectomy.

No intraoperative complications were reported, and no post-operative complications were registered according to the Clavien–Dindo scale. Median time to discharge was 2 days (range 2-3). Median pain VAS score at 24 h was 2 (range 1-5).

Median follow-up was 4 months (range 3-7) with no mesh erosion or extrusion.

Among the 10 patients with preoperative stress urinary incontinence, 4 (40%) reported symptom resolution postoperatively. Two cases of *de novo* stress urinary incontinence occurred (10%), while no patient developed *de novo* urge urinary incontinence.

At three month follow-up visit, POP-Q measurements showed significant improvement, with complete anatomical restoration and symptom resolution in 90% of patients; two anterior compartment recurrences were observed (10%, POP-Q stage 3). Bulge symptoms resolved in all cases. Constipation changes were minimal, and no other *de novo* symptoms occurred. Patient-reported outcomes were favourable, with all patients (100%) reporting Patient Global Impression of Improvement-I scores of 1-2.

Table 1. Perioperative data and surgical outcomes according to POP-Q stage.

Perioperative data		**Surgical outcome**			
All cases	20		Pre-operative	Post-operative	*P* value
Associated surgical procedures, n (%)	20 (100)	POP-Q stage, median (range)			
Ventral rectopexy, n (%)	0 (0)	Anterior	3 (2-4)	0 (0-3)	<0.001
Subtotal hysterectomy, n (%)	20 (100)	Apical	3 (2-4)	0 (0-1)	<0.001
Total hysterectomy, n (%)	0 (0)	Posterior	1 (0-2)	0 (0-1)	0.035
Salpingectomy/salpingo-oophorectomy, n (%)	20 (100)	Stress urinary incontinence, n (%)	10 (50)	6 (30)	0.673
Docking time (min), median (range)	4 (2-12)	Urgency, n (%)	6 (30)	4 (20)	0.628
Console time (min), median (range)	112.5 (87-133)	Nicturia, n (%)	4 (20)	2 (10)	1.000
Operative time (min), median (range)	174 (146-229)	Urge urinary incontinence, n (%)	6 (30)	2 (10)	0.288
Laparoscopic adhesiolysis, n (%)	0 (0)				
EBL (mL), median (range)	20 (20-100)	Hesitancy, n (%)	6 (30)	2 (10)	0.288
Time to discharge (days), median (range)	2 (2-3)	Feeling of incomplete emptying, n (%)	10 (50)	4 (20)	0.177
Conversion to laparoscopy or laparotomy, n (%)	0 (0)				
Intraoperative complications, n (%)	0 (0)	Constipation, n (%)	10 (50)	6 (30)	0.196
Post-operative complications, n (%)	0 (0)	Vaginal bulging, n (%)	20 (100)	2 (10)	<0.001
VAS score at 24 h, median (range)	2 (1-5)	PGI-I, median (range)		1 (1-2)	

POP-Q: Pelvic Organ Prolapse Quantification, EBL: Estimated blood loss, VAS: Visual analogue scale, PGI-I: Patient Global Impression of Improvement, min: Minimum.

Discussion

RAS is increasingly utilised in urogynaecology, particularly for POP surgery, where it has proven to be highly efficient.[3] In advanced urogenital prolapse, the apical segment -whether uterus or vaginal vault- is almost always involved, and inadequate apical suspension is a major determinant of recurrence. Although RSCP is generally associated with longer OTs compared with conventional laparoscopy, advantages include reduced postoperative blood loss and shorter hospital stay, with potential improvements in anatomical outcomes and postoperative morbidity.[5,6,12-14]

To our knowledge, this study represents the first case series describing nerve-sparing RSCP using the Versius® robotic platform. The CMR Versius Surgical System® offers a novel alternative to existing robotic platforms. It is composed of three to four independent bedside units and an open master console, which enhances communication with the surgical team and allows the surgeon to operate either seated or standing. Electrosurgical energy activation and camera control (zooming, rotation, translation) are managed directly through the console handgrips, eliminating the need for foot pedals. Since monopolar and bipolar energy can only be activated from the corresponding instrument handgrip, the risk of accidental activation of the wrong device is reduced.

The compact arms allow access to the patient from multiple angles and enable movement of the elbow without displacing the instrument tip. This minimises arm excursion and reduces the likelihood of collisions between robotic arms or with the bedside assistant -an issue previously reported with open-console platforms.[15] The platform's compact size also facilitates its use in smaller operating rooms and permits easy transfer between locations, making it suitable for centres without a dedicated robotic suite.

The system does not require dedicated robotic trocars, insufflators, or energy systems. Instead, standard

laparoscopic trocars can be used, and the surgeon may select the preferred method of peritoneal access (open, optical trocar, Veress, paraumbilical or subcostal entry). This flexibility enables hybrid approaches and simple conversion to conventional laparoscopy, when necessary, while also contributing to cost containment. However, unlike other platforms, abdominal wall "tenting" after docking is not possible. Another limitation is the relatively shorter length of the instruments, although this can be partially compensated for by advancing trocars without the need for re-docking.

Port placement settings are adaptable to patient BMI, planned procedure, and surgeon preference. The robotic arm architecture mimics human articulation, with wristed joints offering seven degrees of freedom, aiding precise dissection and suturing in deep anatomical fields. The platform provides partial haptic feedback and incorporates a Head-Up Display system that assigns each robotic arm a dedicated colour and icon. Parameters such as energy mode and arm activity are displayed directly on the surgeon's 3D screen, eliminating the need for external monitors and improving safety through continuous visual control.

The Versius® system has shown encouraging results in general, colorectal, gynaecologic, urologic, and thoracic surgery.[10,16-19] However, the limited number of cases and heterogeneity of procedures reported to date restrict the ability to draw definitive conclusions about outcomes for specific techniques.

With regard to RSCP, our findings on docking and OTs, anatomical correction, functional improvement, and perioperative safety are consistent with the literature on robotic platforms.[12-14] Additionally, the low 24-hour VAS pain score in our series may be attributable to the use of standard 5-mm laparoscopic trocars, which are smaller than those typically employed in other robotic systems.[20]

This study is limited by its small cohort and short follow-up. Larger case series and longer postoperative observation are necessary to confirm effectiveness, durability of anatomical correction, recurrence rates, and functional outcomes. Comparative studies between Versius® and established platforms (e.g., Da Vinci) are essential to assess potential advantages in ergonomics, cost-effectiveness, and training curves.

Early reporting of experiences with emerging robotic systems remains crucial to characterise platform performance and standardise procedures.

Conclusion

Our initial findings suggest that RSCP with the Versius® system is feasible and safe, with perioperative and early postoperative outcomes comparable to other minimally invasive techniques. Further multicentre studies with larger cohorts and extended follow-up are required to validate these findings and clarify the potential advantages of this platform within urogynaecology and pelvic reconstructive surgery.

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Informed Consent: All patients provided informed consent for the procedure and the use of anonymised clinical data.

Data sharing: The data underlying this article cannot be shared publicly due to privacy concerns and the inclusion of potentially identifiable patient information. De-identified data supporting the findings of this study are available from the corresponding author upon reasonable request and subject to institutional and ethical approval.

Transparency: The lead author affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned have been explained.

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Supplementary Video Link: https://youtu.be/RuT4OKjHlfY