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Robot-assisted Laparoscopic Approach for Artificial Urinary Sphincter Implantation in 11 Women with Urinary Stress Incontinence: Surgical Technique and Initial Experience

Xavier Biardeau *, *Jérôme Rizk, François Marcelli, Vincent Flamand*

Department of Urology, Lille University Hospital, Lille Nord de France University, Lille, France

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Abstract

Background: Artificial urinary sphincter (AUS) implantation is recommended for women suffering urinary stress incontinence. Robot-assisted laparoscopy allows improved dexterity and visibility compared to traditional laparoscopy, potentially providing significant advantages for deep pelvic surgery.
Objective: To report our surgical technique and initial experience in transperitoneal robot-assisted laparoscopic AUS implantation in women with urinary stress incontinence.
Design, setting, and participants: Eleven eligible patients with AUS implantation or revision using robot-assisted laparoscopy for urinary stress incontinence were included between January 2012 and February 2014 at Department of Urology, Lille University Hospital.
Surgical technique: Procedures were performed with the assistance of a four-arm da Vinci robot. The urethrovaginal space was dissected after transperitoneal access to the Retzius space. An 11-mm port placed in the right iliac fossa allowed introduction of the AUS device. The cuff and balloon tubes were externalised via a 5-mm suprapubic incision. The peritoneum was finally sutured.
Measurements: Clinical data were prospectively collected before, during, and after the procedure. Results were classified as complete continence (no leakage and no pad usage), social continence (leakage and/or pad usage with no impact on social life), or failure (leakage and/or pad usage impacting social life).
Results and limitations: After mean follow-up of 17.6 mo (interquartile range 10.8–26 mo), eight patients (72.7%) had a successful AUS implantation, of whom seven (87.5%) reported complete continence and one had social continence. Two vaginal injuries and two bladder injuries occurred intraoperatively. Two patients experienced early minor postoperative complications and two had a major postoperative complication.
Conclusions: Robot-assisted laparoscopic AUS implantation is a feasible procedure. Further studies will better assess the place of robot-assisted laparoscopy in AUS implantation.
Patient summary: We investigated the treatment of 11 patients with stress urinary incontinence using robot-assisted implantation of an artificial urinary sphincter (AUS). The results show that the procedure is feasible procedure, and future studies will to help assess the place of robot-assisted laparoscopy in AUS implantation.

* Corresponding author. Department of Urology, CHRU Lille, 1 rue Polonovski, Hôpital Claude Huriez, 59000 Lille, France. Tel. +33 3 20444235; Fax: +33 3 20445653.
E-mail address: biardeau.xavier@gmail.com (X. Biardeau).

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1. Introduction

Artificial urinary sphincter (AUS) implantation is recommended for women suffering from either urinary stress incontinence with bladder neck and urethral mobility associated with prior unsuccessful conservative and surgical treatments, or intrinsic sphincter deficiency and limited bladder neck mobility [1]. Initially implantation was via the abdomen, and recent studies report good long-term functional outcomes, with complete or social continence rates of 70–94.4% [2,3]. Open implantation can be challenging, especially in patients with a history of multiple anti-incontinence or pelvic surgical procedures, leading to more intraoperative complications. However, the development of minimally invasive techniques has led to the possibility of laparoscopic AUS implantation [4–8]. Robot-assisted laparoscopy allows improved dexterity and visibility compared to standard laparoscopy and could provide significant advantages for deep pelvic surgery. To date, no AUS implantation using a robot-assisted laparoscopic approach has been reported.

The aim of this study was to report our surgical technique and initial experience in transperitoneal robot-assisted laparoscopic AUS implantation for women with urinary stress incontinence.

2. Patients and methods

2.1. Patients

Eleven patients treated at our centre for AUS implantation or revision using robot-assisted laparoscopy for urinary stress incontinence between January 2012 and February 2014 were included in the study. All patients gave their consent after being verbally informed about the robotic approach before the procedure was conducted.

2.2. Preoperative management

Patients were selected following clinical assessment and urodynamic evaluation. The initial interview included a complete history of urinary symptoms and documentation of prior therapies for incontinence or pelvic organ prolapse. A 3-d bladder diary was completed to assess urinary symptoms. A urogynaecologic examination was performed in the lithotomy and standing positions with an empty bladder to assess the pelvic organs and bladder neck mobility, and with a full bladder to investigate leakage on straining or coughing.

Urethrocystoscopy allowed assessment of the lower urinary tract. A complete urodynamic evaluation included free uroflowmetry and invasive urodynamic procedures to assess detrusor activity, detrusor compliance, and urethral closure pressure. Intrinsic sphincter deficiency was defined as maximal urethral closure pressure of $<$30 cm H_2O. All women with a history of multiple failed anti-incontinence surgeries or intrinsic sphincter deficiency were recommended for AUS implantation.

2.3. Surgical technique

All procedures were performed with the assistance of a four-arm da Vinci robot placed in a left side-docking position by a surgeon with expertise in robot-assisted laparoscopic procedures. A second surgeon experienced in AUS implantation provided assistance.

2.3.1. Installation

Following general anaesthesia, a 14F urethral catheter was inserted. The bladder was emptied to ensure there was enough space for anterior pelvic dissection. The patient was placed in a dorsolithotomy position with a Trendelenburg 25° inclination to facilitate mobilisation of the small intestine and sigmoid colon. The arms were placed along the body with the lower limbs at 30° abduction and flexed at the knees to give full access to the vagina.

2.3.2. Port placement

A 12-mm optic port was placed at the umbilicus and pneumoperitoneum was achieved (insufflation pressure of 12 mm Hg). A 0° laparoscope was then introduced, and after exploration of the peritoneal cavity, three 8-mm ports were successively introduced between the umbilicus and anterior superior iliac spines (Fig. 1). Finally, an 11-mm port was inserted into the right iliac fossa for assistant instruments and insertion of the AUS device.

2.3.3. Access to the Retzius space

Access to the Retzius space was obtained via an arch incision of the parietal peritoneum from one medial umbilical ligament to the other. The bladder was then free from all anterior and lateral attachments, and perivesical fat was cleared laterally to expose the bladder neck.

2.3.4. Incision of the endopelvic fascia

The endopelvic fascia was incised 1 cm from the urethra on both sides, and levator ani fibres were cleared laterally.

2.3.5. Dissection of the urethrovaginal space

Dissection of the urethrovaginal space was initiated via the anterior vaginal wall, below the periurethral fascia at the level of the catheter

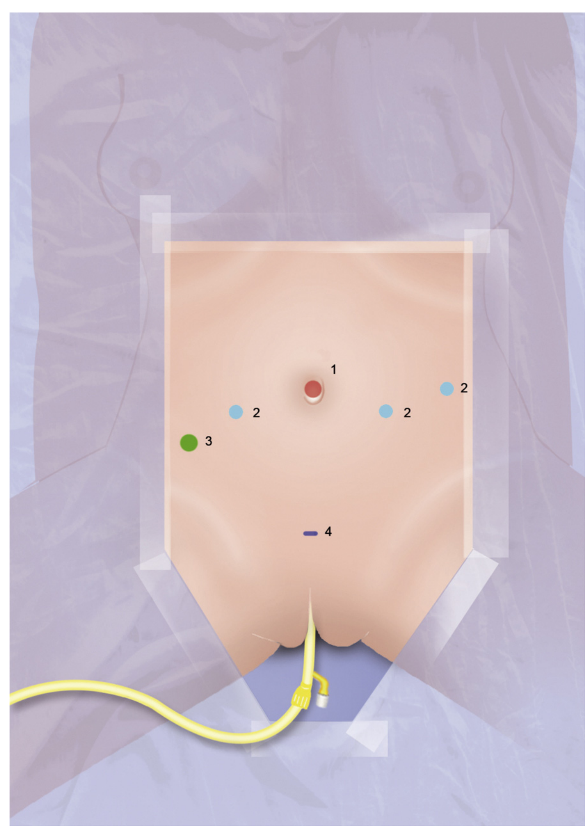

Fig. 1 – Port placement: (1) 12-mm optic port placed at the umbilicus; (2) 8-mm ports placed between the umbilicus and the anterior superior iliac spines; (3) 11-mm assistant port placed in the right iliac fossa; and (4) 5-mm transversal suprapubic incision.