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Surgery in Motion

Total Anatomical Reconstruction During Robot-assisted Radical Prostatectomy: Implications on Early Recovery of Urinary Continence

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Please visit www.europeanurology.com and www.urosource.com to view the accompanying video.

Abstract

Background: The introduction of robotics revolutionized prostate cancer surgery because the magnified three-dimensional vision system and wristed instruments allow microsurgery to be performed. The advantages of robotic surgery could lead to improved continence outcomes in terms of early recovery compared with the traditional surgical methods.
Objective: To describe the total anatomical reconstruction (TAR) technique during robot-assisted radical prostatectomy (RARP). Primary endpoint: evaluation of the continence rate at different time points. Secondary endpoint: evaluation of urine leakage and anastomosis stenosis rates related to the technique.
Design, setting, and participants: June, 2013 to November, 2014; prospective consecutive series of patients with localized prostate cancer (cT1-3, cN0, cM0).
Surgical procedure: RARP with TAR was performed in all cases. Lymph node dissection was performed if the risk of lymph nodal metastasis was over 5%, according to the Briganti updated nomogram.
Measurements: Preoperative, intraoperative, postoperative, and pathological variables were analyzed. Enrolled patients were arbitrarily divided into three groups according to a time criterion. The relationships between the learning curve and the trend of the above-mentioned variables were analyzed using LOESS analysis. Continence was rigorously analyzed preoperatively and at 24 h, 1 wk, 4 wk, 12 wk, and 24 wk after catheter removal.
Results and limitations: In total, 252 patients were analyzed. The continence rates immediately after catheter removal and at 1 wk, 4 wk, 12 wk, and 24 wk after RARP were 71.8%, 77.8%, 89.3%, 94.4%, and 98.0%, respectively. Multivariate analysis revealed that the nerve sparing technique, D'Amico risk groups, lymph node dissection, and prostate volume were involved in the early recovery of urinary continence. One ileal perforation requiring reoperation was recorded. The transfusion rate was 0.8%. Thirty-one (12.3%) postoperative complications were recorded up to 6 mo after surgery. Among these, eight acute urinary retentions (3.2%) and three urine leakages (1.2%) were recorded. There was a lack of randomization and comparison with other techniques. Both anatomical dissection of the prostatic apex and TAR were used. The results may not be generalized to low-volume centers.

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Conclusions: The TAR technique showed promising results in the early recovery of urinary continence, as well as watertight anastomosis and a low rate of urine leakage. The oncologic results were not affected. Comparative studies are needed to support the quality of reported results.

Patient summary: On the basis of our findings, it seems that the risk of urinary incontinence following radical prostatectomy can be lowered via meticulous anatomical reconstruction using a robotic system. Comparative studies are required to support the reported results.

1. Introduction

The ideal radical prostatectomy (RP) is realized when achieving the concurrent presence of urinary continence and sexual potency, with no evidence of positive surgical margins, early complications, or biochemical recurrence, which form the so-called 'pentafecta' [1].

Among these factors, incontinence is a particularly feared side effect of RP because it can significantly compromise the quality of life in patients who undergo RP [2]. Although the physiology of the mechanisms related to urinary continence following RP is still not completely understood, it is known that both the functional and anatomical changes associated with prostate removal coincide with alterations in the urinary sphincter complex and pelvic floor musculature. Moreover, preexisting unmodifiable factors such as age, prostate volume, bladder dysfunction, and other morbidities can influence the achievement and timing of urinary continence recovery after RP [3–7].

The introduction of a robotic system revolutionized prostate cancer surgery. Indeed, the magnified three-dimensional high-definition vision system and the miniaturized wristed instruments allow for microsurgery and the respect of the most delicate anatomical structures. Thus, robotic surgery could lead to improved continence outcomes in terms of early recovery compared with the traditional surgical methods [2].

In this prospective study, we described our total anatomical reconstruction (TAR) technique during robot-assisted RP (RARP), and we reported our results concerning urinary continence recovery in a consecutive series of patients. The primary endpoint was to evaluate the continence rate at different early time points. The secondary endpoint was to evaluate the urine leakage and anastomosis stenosis rates related to the described technique.

2. Materials and methods

2.1. Study population and design

The present study was performed between June, 2013 and November, 2014 at San Luigi Hospital in Orbassano (Turin), Italy, after obtaining approval from our Institutional Ethics Committee. To standardize the surgical procedure and postoperative care (ie, the catheter removal), 20 procedures were performed before starting patient enrolment.

After concluding this phase, the prospective enrolment of the present consecutive series began. The inclusion criteria were patients with localized prostate cancer (clinical stages cT1-3, cN0, cM0) that was suitable for RP. Preoperative assessment included multiparametric magnetic resonance imaging (mp-MRI) of the prostate in all cases.

The exclusion criteria were contraindications for undergoing RARP, neo-adjuvant hormone therapy, and anterior tumors with suspected extracapsular extension on mp-MRI.

All patients underwent RARP performed with the transperitoneal approach. A skilled laparoscopic surgeon with ample experience in pure and robot-assisted laparoscopic surgery for prostate cancer (F. P.) performed all of the prostate apical dissections and TARs.

2.2. Surgical technique

Details of the proposed surgical technique are shown in the accompanying video. A summary of the steps is reported below.

2.2.1. Patient positioning

The patient is placed in the supine position and secured to the operating table; the legs are then spread apart to allow for allocation of the robotic system. The bed is placed in the Trendelenburg position.

2.2.2. Induction of pneumoperitoneum, port placement, and docking of robotic system

Pneumoperitoneum is achieved using a Veress needle inserted in the peri-umbilical area.

Six ports (12 mm port for the optic, three 8 mm ports for robotic instruments, and both 10 mm and 5 mm ports for the assistant) are introduced and placed in a classical fan configuration. Finally, the robot is docked.

2.2.3. Preliminary time and preparation of the endopelvic fascia

After a preliminary exploration of the abdominal cavity, an incision of the parietal peritoneum is made to access the retropubic space. After the prostate is identified, the periprostatic fatty tissue is removed. The endopelvic fascia is incised while preserving the pubo-prostatic ligaments. At the end of these steps, the prostate apex is outlined.

2.2.4. Suture of the deep venous complex

The deep venous complex (DVC) is sutured using two separated 2/0 monofilament sutures, which is performed while preserving the pubo-prostatic ligaments.

2.2.5. Incision of the bladder neck

The visceral layer of the endopelvic fascia is sliced cranially, and the bladder neck dissection then begins. Once it is exposed, the catheter is pulled up using the fourth robotic arm to identify the dorsal attack of the trigone.

The incision is continued posteriorly at the level of the circumference ridge by following a vertical course to dissect the muscular fibers that anchor the bladder to the base of the prostate.

A lingula of muscular tissue that is encountered at the posterior aspect of the bladder neck (ie, the so-called retrotrigonal fascia) is