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Prostate Cancer

Comparisons of the Perioperative, Functional, and Oncologic Outcomes After Robot-Assisted Versus Pure Extraperitoneal Laparoscopic Radical Prostatectomy

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Article info

Abstract

Background: In spite of the increasing use of robot-assisted radical prostatectomy (RALP) worldwide, no level 1 evidence-based benefit favouring RALP versus pure laparoscopic approaches has been demonstrated in extraperitoneal laparoscopic procedures.

Objective: To compare the operative, functional, and oncologic outcomes between pure laparoscopic radical prostatectomy (LRP) and RALP.

Design, setting, and participants: From 2001 to 2011, 2386 extraperitoneal LRPs were performed consecutively in cases of localised prostate cancers.

Intervention: A total of 1377 LRPs and 1009 RALPs were performed using an extraperitoneal approach.

Outcome measurements and statistical analysis: Patient demographics, surgical parameters, pathologic features, and functional outcomes were collected into a prospective database and compared between LRP and RALP. Biochemical recurrence–free survival was tested using the Kaplan-Meier method. Mean follow-up was 39 and 15.4 mo in the LRP and RALP groups, respectively.

Results and limitations: Shorter durations of operative time and of hospital stay were reported in the RALP group compared with the LRP group ($p < 0.001$) even beyond the 100 first cases. Mean blood loss was significantly lower in the RALP group ($p < 0.001$). The overall rate and the severity of the complications did not differ between the two groups. In pT2 disease, lower rates of positive margins were reported in the RALP group ($p = 0.030$; odds ratio [OR]: 0.396) in multivariable analyses. The surgical approach did not affect the continence recovery. Robot assistance was independently predictive for potency recovery ($p = 0.045$; OR: 5.9). Survival analyses showed an equal oncologic control between the two groups. Limitations were the lack of randomisation and the short-term follow-up.

Conclusions: Robotic assistance using an extraperitoneal approach offers better results than pure laparoscopy in terms of operative time, blood loss, and hospital stay. The robotic approach independently improves the potency recovery but not the continence recovery. When strict indications of nerve-sparing techniques are respected, RALP gives better results than LRP in terms of surgical margins in pathologically organ-confined disease. Longer follow-up is justified to reach conclusions on oncologic outcomes.

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1. Introduction

Radical prostatectomy (RP) is a standard treatment for localised prostate cancer. The first laparoscopic radical prostatectomy (LRP) was performed in 1991 and thought not to be feasible because of the excessive operative time [1,2]. However, in the following years, the development of minimally invasive surgery was driven by work in Europe. Some centres can now report considerable experience and are able to standardise the technique. Experienced surgeons have described the various advantages of laparoscopy [3,4]. And yet LRP remains a technically demanding procedure and requires a learning curve [4,5]. These difficulties and the emergence of robotic assistance that improves precision led laparoscopic urologists to develop the technique of robot-assisted radical prostatectomy (RALP) [6–8]. One of the purposes of the robotic assistance was to reduce the learning curve, even in laparoscopically naive surgeons, without sacrificing the oncologic standards established by the open approach [8,9].

Recent reviews and meta-analyses of the literature recently highlighted the potential benefit of RALP regarding the functional outcomes [10,11]. In a recent meta-analysis, Tewari et al. also found that total perioperative complication rates were higher for LRP than for RALP [12]. Authors highlighted that the lack of randomised controlled trials were drawbacks in all published studies. The two first controlled trials comparing LRP and RALP were recently published using a transperitoneal approach [13,14]. Authors reported better functional results in terms of potency favouring RALP in both series and only in terms of continence recovery in one series. However, only a few patients were included, limiting the power of analysis in comparing low events rates such as positive margins, operative complications, and severe incontinence. Most of these series reported short-term experience with the transperitoneal (but not the extraperitoneal) approach.

The aim of our study was to compare the perioperative parameters and the functional and oncologic outcomes between pure LRP and RALP using an extraperitoneal approach and performed in a high-volume laparoscopy reference centre.

2. Patients and methods

2.1. Patient selection

Between July 2001 and December 2011, 2386 consecutive men underwent a LRP including 1377 pure LRPs and 1009 RALPs. Indications of surgery were identical in the cases of pure LRP or RALP. We performed the first LRP and the first RALP in our department in 2001, and we have been performing RALP routinely since 2006. The respective rates of LRP and RALP procedures for RP were 95.6% and 4.4% before 2006, 55.9% and 44.1% during the period 2007–2009, and have been 4.6% and 95.4% since 2010. Most of the LRPs were performed by three senior surgeons (L.S., C.C.A., A.D.L.T.), and the total number of RALPs by two senior surgeons (C.C.A., A.D.L.T.) who had performed >100 LRPs before starting the RALP learning curve. Mean follow-up in our cohort was 50.4 mo (1–138 mo). Mean follow-up was 39 and 15.4 mo in the LRP and RALP groups, respectively. The study was carried out in accordance with our local good clinical practice rules.

2.2. Surgical procedure

The da Vinci system including three robot arms and a single console (first generation) was used for all RALPs. We described the surgical technique and the different steps of the surgery previously [15]. The bladder neck was incised circumferentially with an attempt to spare the it except for high-risk prostate cancers at risk of seminal vesicle invasion (assessed by preoperative magnetic resonance imaging [MRI]). A standard lymphadenectomy was performed prior to the completion of the vesicourethral anastomosis in patients whose Gleason score was >6 and/or prostate-specific antigen (PSA) was >10 ng/ml. A running vesicourethral anastomosis was then performed. At the beginning of the experience, a 3-0 polyglactin suture on a 5/8 circle tapered needle was used. For 2 yr we used a bidirectional barbed suture to perform the running anastomosis. The anastomosis started with a posterior reconstruction of the rhabdosphincter as described by Rocco. An anterior reconstruction was performed suspending the anastomosis to the Santorini plexus.

Preoperatively, potent low- or intermediate-risk patients underwent a nerve-sparing procedure. An intrafascial dissection as a nerve-sparing procedure could be proposed to very low-risk patients who were potent preoperatively. Very low-risk prostate cancer was defined by a clinical T1c cancer with favourable factors including a PSA < 10 ng/ml, a moderate extent of cancer on positive cores, few cores involved with cancer, and favourable MRI findings (iT1 or small iT2 cancer). The urethral catheter was usually removed on postoperative day 7 with no cystogram.

2.3. Database and statistical analysis

Data were collected prospectively into a database by a clinical research assistant (MM) including preoperative clinical and biologic characteristics, surgical data, and postoperative parameters. Pathologic assessments of RP specimens by a senior pathologist were recorded. After fixation, the apex and base (3-mm-thick slices) were removed from each specimen and examined by the cone method. The prostate body was step-sectioned at 3-mm intervals perpendicular to the long axis (apical-basal) of the gland. Positive surgical margins were defined by the presence of tumour tissue on the inked surface of the specimen. All patients prospectively completed self-administered questionnaires concerning their quality of life (European Organisation for Research and Treatment of Cancer QLQ-C30) and their voiding and sexual disorders (International Index of Erectile Function [IIEF]-5), preoperatively and at 1, 3, 6, 12, and 24 mo after RP. Potency was defined as the ability to achieve an erection sufficient for penetration (full erections or diminished erections are routinely sufficient for intercourse) with or without the use of a phosphodiesterase type 5 enzyme inhibitor (excluding cases with intracavernous injection of prostaglandin E or vacuum). Urinary continence was assessed by questionnaires and defined as the absence of pads (strict urinary continence). Continence and potency results were studied in the overall cohort regardless of the continence and potency status before surgery. Phosphodiesterase type 5 enzyme inhibitors were systematically proposed at patient discretion. The use of oral erectogenic medications was not statistically different between LRP and RALP groups. Biochemical recurrence was defined as any detectable serum PSA (>0.2 ng/ml). Perioperative complications were noted and reported according to the updated Clavien classification [16]. The qualitative data were tested using the chi-square or the Fisher test as appropriate. The quantitative data were analysed by the Mann-Whitney test. Multivariable analyses used a regression logistic model. In these multivariable analyses, we have only included the patients operated beyond the 100 first cases of each procedure and