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ORIGINAL ARTICLE

# Robotic radical prostatectomy after aborted prostatectomy: still feasible? The experience from a tertiary care center

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## Abstract

To describe the surgical management of patients who had radical prostatectomy previously attempted but aborted due to diverse causes. Patients who underwent an "aborted prostatectomy" were extracted from the institutional prostatectomy database. A description of the tailored robotic approach was reported for each case. Tips and tricks for the accomplishment of robotic prostatectomy after aborted prostatectomy were reported. Six clinical cases were analyzed. Three patients had aborted prostatectomy due to complicated dissection hindered by pelvic mesh and bowel adhesions; one prostatectomy was aborted due to anesthesiology/respiratory matters; one for narrow pelvis; one due to abnormal pelvic vascular anatomy. All patients successfully underwent robotic prostatectomy at our institution. In five patients, standard transperitoneal robotic approach was performed. In one patient, robotic transperineal approach was mandatory. Median operative time was 282 min (86–460). Median estimated blood loss was 325 mL (50–1000). Two patients had positive surgical margins. One patient was found with nodal metastasis at final pathology. Neither perioperative nor postoperative complications were reported. At last follow-up, PSA was undetectable in 5/6 patients. Even after previous aborted prostatectomy, robot-assisted prostatectomy is feasible, with acceptable results. The case-by-case tailoring of the technique is the key for a successful intervention.

**Keywords** Aborted · Radical prostatectomy · Robot-assisted · Alternative approach · Surgical technique · Redo

## Introduction

Prostate cancer (PCa) is a significant cause of morbidity and mortality [1]. It is the most frequently diagnosed cancer in the USA, with an estimated incidence of 233,000 new cases, and constitutes the second most frequent cause of cancer death [2]. For clinically localized PCa, multiple management strategies should be considered including active surveillance, radiation therapy and radical prostatectomy [3, 4]. Open radical prostatectomy has been considered the standard surgical approach for localized PCa. During the last decade, an increasing number of prostatectomies have shifted to the minimally invasive approach, sponsored by the advantages of robotic surgery. Indeed, robot-assisted radical prostatectomy (RARP) has been reported able to improve perioperative and postoperative outcomes [5]. The rapid expansion of RARP in the USA made robotic prostatectomy the most common approach [6]. The vast majority of RARP is successfully concluded, but occasionally, prostatectomy may be aborted due to several reasons. Increased body mass index (BMI), anesthesiology/respiratory issues and intra-abdominal adhesions from previous abdominal surgeries have been described as predictive factors for aborting the prostatectomy [7–10]. Depending on the disease characteristics, options for patients after aborted prostatectomy can include watchful waiting or radiation therapy, along with the possibility of androgen deprivation therapy. Unfortunately, not all patients are able to receive this management due to the side effects of the hormonal therapy and the eventual necessity of treatment due to the disease aggressiveness [11]. With careful counseling, RARP could represent an option even after aborted prostatectomy [12]. In this paper, we reported our experience with RARP after aborted prostatectomy. Specifically, we focused on the tailored solutions chosen case-by-case.

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## Materials and methods

The institutional review board approved prostatectomy database was queried for all radical prostatectomies performed between July 2014 and June 2017.

Specifically for the purpose of the study, only patients who underwent RARP after previous aborted prostatectomy were considered. Surgical data (reason for failing the procedure, previous surgical history, operative time, estimated blood loss, length of stay and PSA data) were recorded. Oncological follow-up consisted of a physical examination and PSA performed every 3 months during the first year after treatment.

All procedures were performed in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all patients before undergoing the surgery. For this retrospective analysis, specific formal consent was not required.

## Results

Six patients who had RARP after aborted prostatectomy were extracted. RARP was successful completed in all the patients. In five patients, standard transperitoneal RARP was performed. In one patient, transperineal robotic approach was chosen. Median operative time was 349 min (217–460). Median blood loss was 425 mL, with a median hemoglobin drop of 3.2 g/dL. Median prostate volume at final pathology was 50 cc (34.7–66.6). Table 1 reports the intraoperative, the postoperative and the pathology data.

The extracted clinical cases are hereby reported in detail.

### Patient A

A 69-year-old patient with a BMI of 38.5 and initial PSA of 13 ng/mL was referred to our institution after an aborted RARP. Biopsy reported PCa Gleason score 8 (4 + 4), in 6 out of 20 cores (8 mm, involving up to 40% of the core). The procedure was aborted due to poor cardiopulmonary reserve intraoperatively, troubles with ventilation and hypotension due to the obesity. The patient declined to be treated with external beam radiation therapy and androgen deprivation therapy. He was referred to our institution. The patient's characteristics and the anesthesiology matters suggested for robot-assisted transperineal prostatectomy. Our technique for robotic transperineal prostatectomy was previously described [13] (Fig. 1). Briefly, the patient was placed in exaggerated dorsal lithotomy. A 2.5-cm semilunar incision was made in the midline, between the ischial tuberosities. The subcutaneous tissue was dissected, and the central tendon of the perineal body was identified and cut. The rectourethralis muscle was then found and transected to expose the space inferior to the membranous urethra, to identify and retract the external sphincter. The Gelport was placed, then the robotic ports introduced, and the Si robot docked. The entire procedure was performed using standard

**Table 1** Robotic-assisted laparoscopic prostatectomy after aborted prostatectomy

| Patient | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| Aborted approach to prostatectomy | RARP | Open RP | Open RP | RARP | Open RP | RARP |
| Reason for aborted prostate | Ventilation | Mesh/adhesions | Mesh/adhesions | Mesh/adhesions | Narrow pelvis | Prominent veins/ D'Andrea's disease |
| Robotic approach | Transperineal | Transperitoneal | Transperitoneal | Transperitoneal | Transperitoneal | Transperitoneal |
| Prior prostate cancer treatments | None | None | None | XRT, attempted cryo | None | None |
| EBL (mL) | 50 | 250 | 400 | 1000 | 400 | 150 |
| Drop in Hgb (g/dL) | 1.7 | 4.4 | 3.8 | 2.8 | 1.3 | 1.8 |
| Operative time (min) | 460 | 347 | 371 | 217 | 86 | 180 |
| Complications | None | None | None | None | None | None |
| Gleason score on pathology | 3 + 4 = 7 | 3 + 4 = 7 | 3 + 4 = 7 | 4 + 4 = 8 | 3 + 4 = 7 | 3 + 4 = 7 |
| Surgical margin status | Positive | Positive | Negative | Negative | Negative | Negative |
| Number of nodes positive | 0 | 0 | 0 | 1 | 0 | 0 |
| LVI+ | 0 | 0 | 0 | 1 | 0 | 0 |
| Pathological prostate weight (g) | 66.6 | 34.7 | 61 | 37 | 62 | 52 |
| PSA at 12 months | < 0.03 | < 0.03 | < 0.03 | 0.69 | < 0.03 | < 0.03 |

*LVI* lymphovascular invasion, *EBL* estimated blood loss; *Hgb* hemoglobin, *RALP* robotic-assisted laparoscopic prostatectomy, *RP* radical prostatectomy

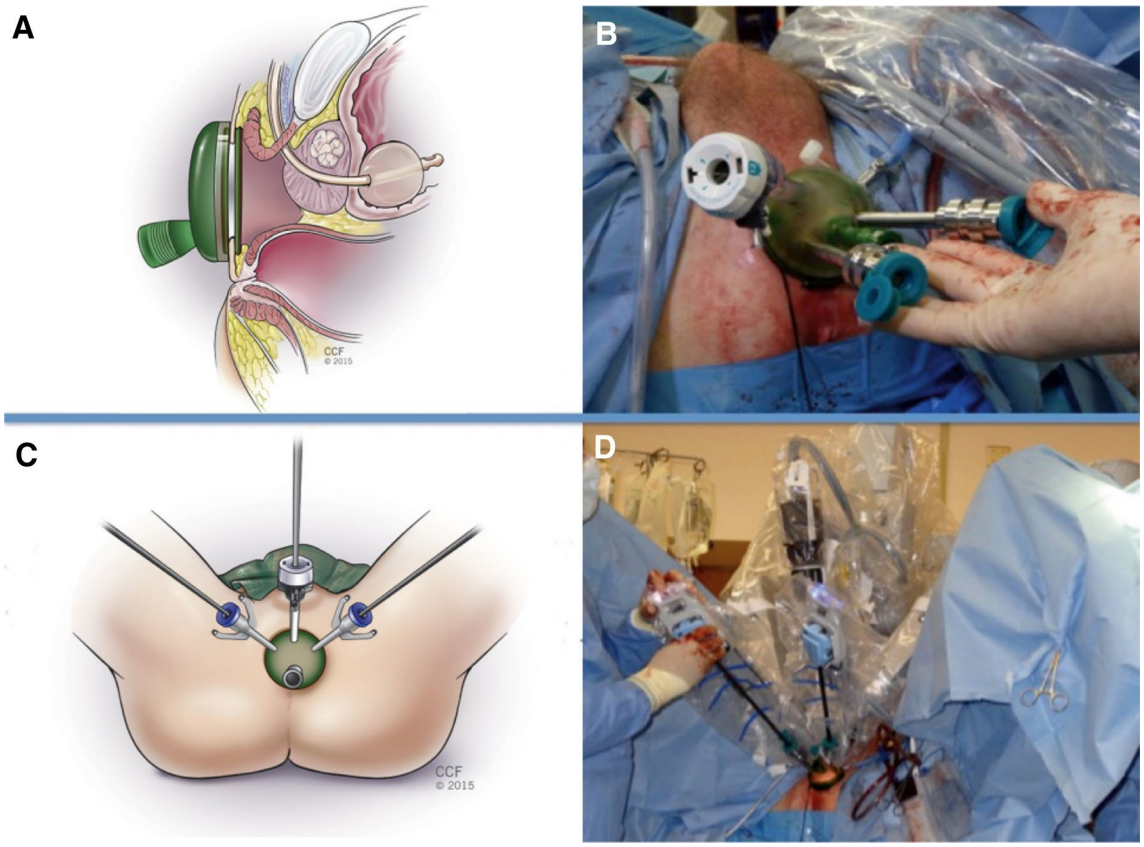


**Fig. 1** **a** Sagittal view showing the Gelport placement in relation with the prostate; **b** robotic ports placed into the Gelseal cap in the perineal area before Da vinci robot docking; **c, d** patient in exaggerated lithotomy position with the side robot docking

insufflation with pressures of 12–15 mmHg. The key steps of open transperineal RP were reproduced. No complications were reported during the procedure.

## Patients B and C

The patient B was a 58-year-old patient who was referred with a PSA of 4.6 ng/mL and previous biopsy showing PCa at the right base, Gleason score 7 (3 + 4), in two out of two cores involving 40% of the core (5 mm). Open retropubic radical prostatectomy was aborted due to multiple intra-abdominal adhesions after prior bilateral laparoscopic inguinal hernia repair with mesh apposition. After coming to our attention, the patient was scheduled for RARP with transperitoneal approach. In these patients, key point was a modified port placement, whereby the Veress access was obtained two fingerbreadths slightly lateral to the prior periumbilical surgical scar. Needle placement was uncomplicated and initial abdominal insufflation pressures were low. Extensive adhesions were located in the pelvis with only a few adhesions at more cranial aspect, in the abdominal cavity, allowing for standard placement of the remaining ports. After adhesiolysis, similar steps were performed as described below for patient C, for releasing the mesh.

Patient C was a 56-year-old male with previous history of bilateral inguinal hernia repair with mesh in which open retropubic radical prostatectomy was attempted but aborted due to extensive adhesions. His initial PSA was 4.0 ng/mL and the prostate biopsy showed PCa Gleason score 7 (3 + 4) in two out of two cores (6 mm, involving 80%). This patient had a similar clinical scenario to the aforementioned patient B. Port placement was performed as a standard "W" shape starting with the camera port 2 fingerbreadths above the umbilicus. In this case as well, the key strategy was to begin the dissection along the most lateral aspect of the abdominal wall, where the bowel met the abdominal wall. As such, a surgical plane can usually be discovered without violation of the peritoneum. This plane was then developed down into the pelvis. Once the adhesions were encountered with the respective mesh, the dissection was moved on the contralateral side and the same technique was performed to develop the dissection plane. As soon as the plane became uncertain, the attention was then moved to the midline: the medial umbilical ligament was retracted, and the anterior peritoneum was incised bilaterally. Noteworthy, in our experience

with other pelvic surgical dissections, we found that if a plane can be established between the posterior rectus sheath and the mesh, this plane can potentially be followed down to the pubic bone. Accordingly, a surgical plane between the mesh and the pubic bone was then achieved (Fig. 2). This plane is essential for dropping the entire bladder during the dissection towards the prostate. Once this crucial step is carried out, the lateral dissection and this new medial dissection plane under the pubic bone is identified and dissection starts connecting these two points. These steps need to be done with extreme caution as the bowel usually adheres down in the pelvis. It is possible that a portion of the mesh needs to be excised to preserve the integrity.

## Patient D

Patient D was a 69-year-old man with history of PCa. He previously underwent external beam radiation for PCa Gleason score 7 (4 + 3) in five out of five cores. Thereafter, he had a local recurrence followed by attempted salvage cryotherapy. The procedure was not completed due "non-negotiable right pubic ramus interference" with the right anterior probe placement. Later on, the patient underwent at another institution an attempted RARP that was aborted due to extensive intrapelvic adhesions on to a "large flap of mesh" in the lower pelvis. We approached this patient with a robotic transperitoneal approach, similar to what described for patients B and C. The procedure was performed without complications.

## Patient E

A 55-year-old man diagnosed with adenocarcinoma of the prostate Gleason 6 (3 + 3) in 10 out of 12 cores (up to 100% of the cores involved) was scheduled for radical prostatectomy. An open approach was attempted at another institution but aborted due to the deep location of the prostate into the pelvis, making the access to the dorsal venous complex and the urethra unfavorable by an open approach. The patient was referred to our institution and he successfully underwent RARP with transperitoneal approach. By robot-assisted approach, the procedure was straight forward and the pelvic "anatomical abnormality" did not represent a difficulty.

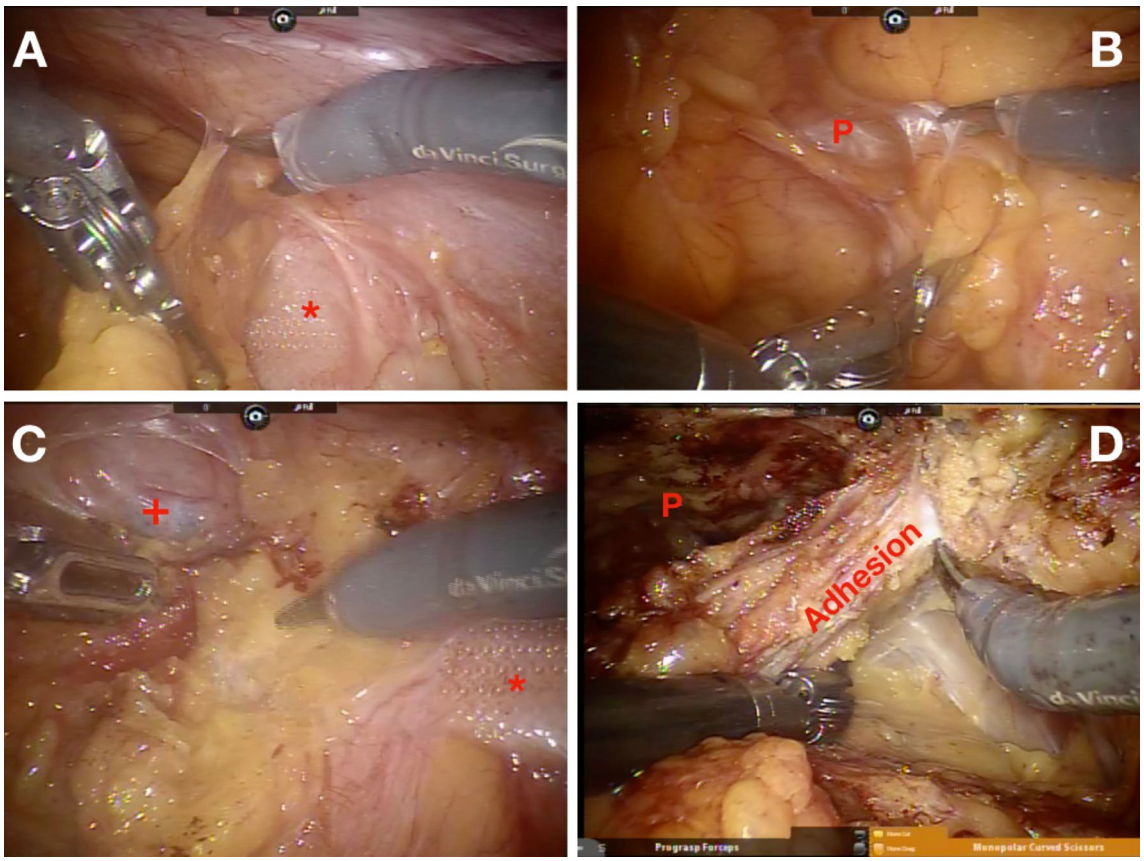


**Fig. 2** Right adhesiolysis secondary to previous inguinal repair with mesh, **a** liberation of adhesions on the abdominal wall, **b** development of perivesical plane to get into the space of Retzius, **c** dissection of bladder and liberation of adhesions from the pubic bone, **d** releasing bladder from the pubic bone (asterisk, mesh; P, perivesical space; plus sign, pubic bone)

### Patient F

A 60-year-old man with a previous history of D'Andrea's disease had a prostate biopsy showing PCa, Gleason score 6 (3 + 3) in 12 out of 12 cores. The initial RARP was aborted due to an extremely abnormal pelvic vascular anatomy and enlarged blood vessels crossing the bladder neck. A preoperative pelvic CT scan revealed prominent external iliac vein, 3 cm in diameter. The patient was referred to our institution and RARP was successfully completed. The preoperative imaging study represented a fundamental examination in the preoperative planning of the surgery. Moreover, a careful pelvic lymphadenectomy and dissection of the vein crossing the bladder neck were the key factors for the success of the intervention. No complications were reported during the procedure.

## Discussion

Several issues may influence the surgical feasibility of radical prostatectomy. Factors such as previous abdominal surgery had been associated with a 90% risk of adhesion formation [14]. Nevertheless, this risk could potentially be diminished by the advancement of the surgical technology applied in robotic surgery. A better visualization of the intra-abdominal organs and improvement instruments dexterity can be a valuable help in the adhesiolysis during the RARP. Siddiqui et al. [15] included a cohort of 1049 patients with previous abdominal surgery where 5 had bowel injuries and 3 of them had a history of prior abdominal surgery. These data suggest that previous abdominal surgery is not a contraindication for RARP.

Conversely, among the patients we evaluated, two had prostatectomy aborted due to previous mesh placement for inguinal hernia repair causing consistent adhesions. We underline that these patients were initially counseled for open retropubic radical prostatectomy. Accordingly, Katz et al. reported a case series where bilateral laparoscopic inguinal hernia repair was found to make subsequent open radical prostatectomy a more complex procedure [16]. Lallas et al. reported their experience with 27 patients who underwent RARP and inguinal hernia repair with mesh apposition [17], evaluating the perioperative data and the rate of positive surgical margins. Their experience showed that RARP is feasible and safe after inguinal hernia repair, with comparable perioperative, oncologic and functional outcomes to radical prostatectomy without previous inguinal hernia repair.

In our experience, we learnt that the meshes were medial to the internal ring and thus did not compromise the previous hernia repair. Once the bladder was completely mobilized and the prostate was exposed, a standard RARP was carried out with no complications.

One of our aborted prostatectomy cases was influenced by obesity that potentially caused ventilation issues during the anesthesia induction. Morbid obesity is one of the major factors causing an increase in intra-abdominal pressures, as well as peak ventilatory pressures leading to decreased pulmonary ventilation. Regarding this point, current evidence favors RARP for obese patients. On a retrospective analysis of 9108 obese patients who underwent radical prostatectomy, authors suggested that the use of RARP might reduce the length of stay and the blood transfusions compared to open prostatectomy [18].

The complexity of the reported case inclined our decision to choose a transperineal robot-assisted approach as an alternative to avoid pneumoperitoneum and cardiopulmonary issues encountered in the patient's previous surgery [13]. Such an approach is promising. Indeed, beyond the potential advantages of further reducing the invasiveness of robotic surgery, other pros include the reduced anesthesiology challenges, particularly in obese patients, due to the possibility of avoiding the Trendelenburg position. Moreover, several advantages have been described, including the lower postoperative discomfort, the more rapid resumption of physical activity and return to work. Particularly, transperineal RARP might be easier in patients with previous pelvic surgery. It is known from the open perineal approach literature that urine control postoperatively is mostly immediate due to preserved urethra–sphincter complex anatomy [13]. We underline that the Da Vinci (Intuitive, Sunnyvale, CA, USA) Si platform was used in this case, with inherent drawbacks. Upcoming platforms purpose-built for single-site surgery will facilitate the transperineal approach and expand its indications [19–21]. With the advent on the market of the dedicated instrumentation, we look forward to clinical experiences [20].

The paper is not devoid of limitations. First, its retrospective design. A very small case series was extracted, but we underline the unique features of patients evaluated. To the best of our knowledge, this represents the largest single institution case study of patients who underwent RARP after aborted prostatectomy. One could argue that we did not consider the surgical experience of the institutions in which the reported patients had their initial surgery attempted. It is possible that in centers with more consistent surgical experience, the here described patients would have successfully undergone radical prostatectomy on the first attempt.

Notwithstanding these limitations, we believe that the present report could add value to the available literature by describing strategies for approaching a very selected cohort of patients in a high-volume institution with robotic expertise. Particularly, we underline the value of the transperineal robotic approach both for the surgical and the anesthesiology

issues when transperitoneal access is not feasible, as well as intraoperative strategies that can be used when there has been prior pelvic instrumentation.

## Conclusions

In our experience, after aborted prostatectomy, RARP can be performed with acceptable results. A careful analysis of the prior attempt has to be performed to maximize the planning of the redo surgery.

### Compliance with ethical standards

**Conflict of interest** Jihad H. Kaouk declares that all conflicts of interest, including specific financial interests and relationships and affiliations relevant to the subject matter or material discussed in the manuscript (e.g., employment/affiliation, grants or fundings, consultancies, honoraria, stock ownership or options, expert testimony, royalties, or patient filed, received or pending), are the following: Endocare, Inc, and Intuitive Surgical. J. H. Kaouk (consultant). Jaya Chavali, Juan Garisto, Riccardo Bertolo, Jose Agudelo, Julien Dagenais declare they have no conflict of interest.

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