ABSTRACT

Objective: Comparative surgical differences in high-risk versus low-risk prostate cancer with additional tips and tricks are described during performing robotic radical prostatectomy. In high-risk prostate cancer, presence of severe adhesions and extra-capsular disease might complicate robotic surgery and interfere with finding correct tissue plane of dissection. Although lack of tactile tissue feed-back might be a disadvantage in robotic surgery, visual clues and experience of the surgeon might play an important role.

Key Words: Robotic radical prostatectomy, High-risk, Low-risk, Surgical differences

INTRODUCTION

In 1998, D’Amico and colleagues proposed a three-group risk stratification system to predict post-treatment biochemical failure following radical prostatectomy (RP) and external-beam radiotherapy (EBRT) that classified non-metastatic prostate cancer (PCa) into low, intermediate and high-risk PCa according to initial serum PSA, clinical T stage and biopsy Gleason score (1). Low-risk PCa was defined as 1992 AJCC T1/T2a, and PSA ≤10 ng/mL, and Gleason score ≤6. Intermediate-risk PCa was defined as 1992 AJCC T2b, and/or PSA 10–20 ng/mL and/or Gleason 7 disease. High-risk PCa (HRPC) was classified as having any one of the following features including 1992 AJCC ≥T2c, PSA >20 ng/mL or Gleason 8–10 disease (1).

Tissue characteristics are expected to be different in high-risk versus low-risk disease. Herein, comparative surgical differences in high-risk versus low-risk prostate cancer with additional tips and tricks are described during performing robotic radical prostatectomy (RARP).

Description of Surgery

We previously reported our technique of RARP using the Da Vinci robotic surgical system (Intuitive Surgical, Sunnyvale, CA, USA) (2).

We use a transperitoneal approach patient in the steep (30°) Trendelenburg position. A total of 5 abdominal ports are placed, including a 12-mm port for the camera, three 8-mm ports for the robotic arms, and a 12-mm port for bedside assistance for Da-Vinci-S surgical robot. If we use Da Vinci xi surgical robot, we use 8-mm ports for all robotic arms including the camera port. We place the 4th-arm on the right side of the patient and control it with the right hand.

The procedure is started by making an incision on the anterior peritoneal covering of the Douglas pouch,
approximately 1 cm proximal to its reflection on the rectum. Vasa deferentia (VD) and seminal vesicles (SV) are dissected and Denonvilliers’ fascia is opened. Anterior attachments between the bladder and abdominal wall are taken down by monopolar scissors and the Retzius space is entered. The endopelvic fascia is exposed completely after removing fatty tissue on it (defatting), opened and levator ani muscle fibers are dissected off all the way along the lateral prostatic fascia. The dorsal venous complex (DVC) is suture tied distal to the apex of the prostate.

Next, the detrusor apron overlying the prostate anteriorly is identified and dissected superiorly until the entrance of the urethra into the prostate at the bladder base is observed where its anterior wall is incised. The posterior neck area is checked for the presence of the median lobe and incision of the urethra at this level is completed. Subsequently, high anterior release and neurovascular bundle (NVB) dissections are carried out. The procedure is completed after division of DVC and vesicourethral anastomosis with the use of the van Velthoven technique with or without posterior rhabdo-sphincter reconstruction [2].

**PERITONEAL INCISION AT THE LEVEL OF DOUGLAS’ POUCH**

**High-risk Disease:** Severe adhesions between peritoneum and underlying tissues might be present suggesting invasion of the tumor.

**Low-risk Disease:** Normally, no adhesion is expected between peritoneum and underlying structures.

**DISSECTING SEMINAL VESICLES AND VAS DEFERENCES**

**High-risk Disease:** Severe adhesions between SVs, VDs and surrounding tissues may exist. These anatomical structures may be firm and stuck to the surrounding tissues suggesting invasion of the prostate cancer (Figure 1A). There is a risk of losing tissue planes and identification of the correct anatomical planes during dissection.

**Low-risk Disease:** SVs and VDs are easily dissected without any adhesions. Tissue planes are easily identified during dissection (Figure 1B).

**OPENING DENONVILLIER’S FASCIA**

**High-risk Disease:** Denonvillier’s fascia may be thickened and stuck to the prostate. Adhesions between prostate and rectum may be present. Particularly in patients with scarce pararectal fatty tissue and in the presence of extraprostatic cancer extension, there is a risk of rectal injury. In addition, developing the plane between the prostate and the rectum may be even further difficult particularly in patients on previous androgen deprivation therapy. Differences in the color of the tissues can give clues to the operating surgeon. Unnecessary bleeding may further interfere with the vision complicating the dissection. In case of bleeding, intra-abdominal CO₂ pressure can be increased gradually and temporarily to decrease bleeding (Figure 2A).

![Figure 1: A] Dissecting SVs and VDs in high-risk disease. Arrow: severe adhesions are identified around left SV, arrowhead: Douglas’ pouch. B] Dissecting SVs and VDs in low-risk disease. Arrow: no adhesion is identified around right SV, arrowhead: Douglas’ pouch.](image-url)


Low-risk Disease: Denonvillier’s fascia is easily opened without any adhesions. Tissue planes between prostate and rectum are easily identified. Prostate might possibly be dissected off of the rectum down to the apex (Figure 2B).

EXCISION OF PERIPROSTATIC FAT TISSUE

High-risk Disease: There might be metastatic lymph nodes in the periprostatic fatty tissue therefore it should not be pushed back but instead excised and send for pathologic evaluation.

Low-risk Disease: No metastatic LNs are expected to be present in the periprostatic fatty tissue.

DIVIDING THE PLANE BETWEEN PROSTATE AND BLADDER

High-risk Disease: Invasion of the bladder neck may be present appearing as severe adhesions and invading bulky tumor which may cause losing correct planes of dissection. Therefore, identification of the urethra and entering into the bladder can be difficult. Unnecessary bleeding may complicate further dissection. In case it occurs, intra-abdominal CO2 pressure should be increased to decrease bleeding. Presence of an experienced assistant surgeon is also crucial in addition to an experienced console surgeon (Figures 3 and 4).
In order to perform maximal NVB sparing, prostatic pedicles are dissected close to the prostatic capsule, no cautery is applied and high anterior release intrafascial NVB sparing technique can be applied (Figures 5B).

**Low-risk Disease**: Junction between prostate and bladder neck is easily identified, urethra is easily exposed and dissected (Figures 3 and 4).

**DISSECTING PROSTATIC PECICLES**

**High-risk Disease**: Severe adhesions may be present between rectum and prostate suggesting the presence of extraprostatic disease. Extrafascial and wide excision should be performed without sparing neurovascular bundles (NVB) particularly if not dissected easily and stuck to the surrounding anatomical structures suggesting tumor invasion (Figures 5A).

**Low-risk Disease**: In order to perform maximal NVB sparing, prostatic pedicles are dissected close to the prostatic capsule, no cautery is applied and high anterior release intrafascial NVB sparing technique can be applied (Figures 5B).

**APICAL DISSECTION**

**High-risk Disease**: There may be severe adhesions at the level of the prostatic apex complicating the dissection. Lack of tactile tissue feed-back might be a disadvantage in robotic surgery. Therefore, visual clues and experience of the surgeon is important. Care should be paid in order not to cause positive...
pressure down to 10 mmHg to decrease the compression on veins and better identify them. We use monopolar or bipolar coagulation in addition to polymer or metal endoclips as needed, for the ligation of small vessels and lymphatics.

TAKING HOME MESSAGES

1. Tissue characteristics may be different in high-risk prostate cancer compared to low-risk disease and lack of tactile tissue feedback might be a disadvantage in robotic surgery. Therefore, visual clues and experience of the surgeon are important.

2. Seminal vesicles and vas deferentia may be firm and stuck with adhesions to surrounding anatomical structures.

3. Denonvillier’s fascia might be thickened and development of the plane between the prostate and the rectum may be difficult due to the presence of extra-capsular disease and previous androgen deprivation therapy.

4. Defining plane between bladder neck and prostate may be difficult in the presence of extra-capsular disease, bladder neck invasion and anteriorly located tumors.

5. Dissection of the apex and prostatic pedicles might be difficult in high-risk patients due to extra-prostatic tumor extension resulting in getting lost of correct tissue planes.
REFERENCES

