Application of emerging technologies to urologic oncology

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CHAPTER 8

ENERGY-FREE NERVE-SPARING LAPAROSCOPIC RADICAL PROSTATECTOMY: BULL-DOG TECHNIQUE


INTRODUCTION

The conventional technique of laparoscopic and robotic radical prostatectomy relies on the use of thermal and electrical energy during lateral prostatic pedicle transection and neurovascular bundle (NVB) release. Concern has been raised that the use of various hemostatic energy sources (monopolar cautery, bipolar cautery, and ultrasound shears) during NVB release can potentially cause collateral thermal damage to the delicate cavernous nerves with a resultant decrease in erectile function [1]. We recently described transrectal ultrasonography (TRUS) guided [2] energy-free lateral pedicle control during nerve-sparing laparoscopic radical prostatectomy (LRP) that completely eliminates all such electric or ultrasonic energies [3]. Our current technique of energy-free nerve sparing LRP with intraoperative real-time appears in line with the established principles of open nerve-sparing radical prostatectomy.

SURGICAL TECHNIQUE

A laparoscopic six-port transperitoneal anterior approach is employed. Ports are placed in a fan array. A conventional 7.5 MHz gray scale TRUS probe (Probe types 8808, type 2102 B-K Medical, Copenhagen, Denmark) is inserted into the rectum during the entire procedure of the LRP, harmonic gray scale US and power Doppler US were used to perform preoperative measurements, intraoperative navigation, and postoperative measurements with special reference to the anatomy of the NVB, any cancer nodule, and the individual prostate apex [2]. Initially the space of Retzius was developed, the bladder neck is transected, and bilateral vasa and seminal vesicles are approached anteriorly. Care was taken not to use any electrocautery or ultrasonic endoshares along the tip and the lateral surface of the seminal vesicule owing its proximity to the NVB. The seminal vesicule artery is controlled with a Hem-o-Lock clip (Weck Closure Systems, Research Triangle Park, NC) and then transected with cold scissors. Recto-prostatic fascia of Denonvilliers is incised entering the prerectal fat and the dissection is bluntly developed along the posterior surface of the prostate toward the prostate apex. The right lateral pedicle and NVB were addressed.
initially. An atraumatic bowel clamp introduced through the 5-mm suprapubic port retracte
the seminal vesicles and vas deferens anterolaterally to the left side, placing the right
lateral pedicle of the prostate on gentle stretch. A 25-mm, atraumatic vascular bulldog
clamp (CEV565, MicroFrance™ Medtronic Xomed, Inc., Jacksonville, Florida) is placed
obliquely at a 45° angle across the right lateral pedicle close to the bladder neck, at
distance from the right posterolateral edge of the prostate. TRUS and power doppler
measurements are obtained before and during application of the bulldog clamp. The lateral
pedicle is carefully divided in small tissue bites, using cold Endoshears. One to 2-mm edge
of pedicle tissue is leaved protruding from the jaws of the bulldog clamp.

Intra-operative TRUS navigation during LRP is performed with prior knowledge of
location and grade of cancer based on pathological report of diagnostic systematic needle
biopsy. TRUS allows real-time monitoring and precise dissection along the posterolateral
edge of the prostate. Once the last few remaining attachments of the lateral pedicle are
divided, the NVB becomes visible. Nerve-sparing is performed antegradely. The NVB is
released by cold cutting and blunt teasing with a soft laparoscopic Kittner along the
convexity of the prostate toward the apex. It is vital that the integrity of the prostatic
capsule is maintained along the posterolateral and lateral aspects of the prostate. Because
thermal energies (electrocautery and ultrasonic shares) are avoided completely, tissue color
and texture is preserved. This results in clear visualization of the correct dissection plane
thus avoiding inadvertent entry into the prostate.

The transected lateral pedicle is sutured superficially. Small, superficial tissue suture
bites using a 4-0 polyglactin suture on an RB-1 needle (suture length 6 to 8 cm) are placed.
The initial stitch is placed at the proximal cut end of the lateral pedicle close to the bladder
neck. One to two additional small suture bites were taken superficial to the jaws of the
closed bulldog clamp to anchor the stitch. Real-time TRUS monitoring confirm these
hemostatic sutures to lie superficial to the NVB without compromising the blood vessels
within the NVB. The bulldog clamp is then removed and any bleeding vessels are
meticulously sutured to complete the hemostasis. Typically, 4 to 6 running suture bites are
necessary. In a similar manner, the left lateral pedicle is transected and the NVB released.
The prostate apex is mobilized, and both NVBs are gently dissected away from the prostate
apex. The urethra is sharply transected with cold scissors, the specimen is entrapped, NVB
hemostasis is confirmed, and urethrovesical anastomosis is completed with a running
suture.
OUTCOMES

We recently reported on 25 patients undergoing laparoscopic nerve-sparing radical prostatectomy using the bulldog technique that mean clamping time was 11 minutes on each prostate pedicle. Mean operative time was 254 minutes and mean estimated blood loss was 334 mL, hospital stay 1.6 days, and catheter duration 5.4 days. No patient required a blood transfusion, and no intraoperative complications occurred. Arterial flow within the NVBs spectral waveform analysis documented before, during, and after pedicle clamping using TRUS power Doppler demonstrated no changes in the mean arterial blood flow resistive index in the NVBs (0.86, 0.85, and 0.85 before clamping, during clamping, and after prostatectomy, respectively).

COMMENT

Concerns were raised whether bulldog clamping of the prostate pedicle causes trauma to the nerves within the NVB. While bulldog clamping adequately occlude blood flow in the lateral pedicle, and achieve a somewhat bloodless field during pedicle transaction and NVB release, it did not interrupt blood flow in the underlying ipsilateral NVB. TRUS demonstration of continued pulsatile blood flow within each NVB during active bulldog clamping, documented that deploying the bulldog clamp across the overlying, bulkier lateral pedicle was delicate enough to not compress the underlying thinner NVB. Doppler measurement of the arterial flow resistive index within the NVB did not change.

CONCLUSION

TRUS monitored cold cutting release of the lateral pedicle and NVB during nerve-sparing LRP, and delicate 4-0 hemostatic suturing completely eliminates the need for all electrocautery, ultrasonic thermal energies and bioadhesives in the proximity of the NVB. Bulldog placement on the lateral prostatic pedicle does not interrupt blood loss flow within the NVB. Preliminary potency data seems encouraging and remain to be confirmed in a large number of patients.
FIGURES

a. The lateral pedicle is carefully divided in small tissue bites, using Endoshears with no electrocautery.

b. TRUS and power Doppler measurements are obtained before and during application of the bulldog clamp to confirm uninterrupted blood flow through the NVB [4,5].

The seminal vesicule artery is controlled with a Hem-o-Lock clip and then transected with cold scissors. No thermal or ultrasonic energy used along the tip and the lateral surface of the seminal vesicule. The whitish Denonvilliers’s fascia is stretched (black arrow) and then incised entering the prerectal fat.
An atraumatic bowel clamp retracting gently to the left the vas deferens and the seminal vesicles. The bulldog clamp is then placed on the right neurovascular bundle close to the bladder neck, at distance from the right posterolateral edge of the prostate.

TRUS probe allows real-time monitoring of the neurovascular bundle and precise dissection along the posterolateral edge of the prostate. The bulldog is deployed on the right pedicle. The lateral pedicle is carefully divided in small tissue bites, using cold scissors.

Intraoperative laparoscopic shows transection of right lateral pedicle with cold scissors, followed by NVB release with bulldog clamp deployed.

The neurovascular bundle is gently teased off of prostate capsule along the posterolateral edge of the prostate using combination of sharp and blunt (Kittner) dissection.

Continued blood flow was documented with Doppler waveform before clamping, during clamping and after removing the bulldog clamp.

Intraoperative laparoscopic view demonstrates superficial hemostatic suturing of transected lateral pedicle using a 4-0 polyglaclin suture on an RB-1 needle.
Intraoperative laparoscopic view of bilateral preserved neurovascular bundles (N) after laparoscopic nerve-sparing radical prostatectomy. No thermal energy, clips, or bioadhesives were used. (R) rectum.

Hemostatic meticulous suturing performed superficial to deployed bulldog clamp.

REFERENCES


