Use of Bone Wax During Laparoscopic Renal Ablative Procedures: Optimizing Port Utilization and Reducing Tract-Site Exposure

Kevin C. Zorn, MD, Ofer N. Gofrit, MD, Arieh L. Shalhav, MD

ABSTRACT

Purpose: We describe the use of a hemostatic wax sealant during laparoscopic renal ablative procedures to allow airtight transabdominal access of the treatment probe through a standard 5-mm port.

Methods: Following Tru-cut biopsy of the renal mass, Bone Wax was used to occlude the external opening of an established 5-mm laparoscopic port. The cryotherapy or radiofrequency treatment probe was then passed through the waxy material and inserted appropriately into the renal lesion while pneumoperitoneal pressure was maintained.

Results: In all cases, the Bone Wax provided a sufficient airtight seal to allow use of the 5-mm port during ablative therapy of renal masses.

Conclusions: Use of Bone Wax during laparoscopic renal ablative surgery allows the use of an established 5-mm port, thus obviating a separate skin incision and reducing the tract-site exposure to the needle probe.

Key Words: Laparoscopy, Renal, Tumor ablation, Radiofrequency ablation, Bone Wax.

INTRODUCTION

Over the past decade, several probe ablative therapies have emerged for the treatment of patients with small, localized renal tumors.1 Cryoablation2 and radiofrequency ablation (RFA)3 have been studied in the greatest detail with promising intermediate oncological outcomes. Various treatment approaches for the 2 modalities, namely laparoscopic and percutaneous, are currently practiced. The decision to choose one approach over another is related to surgeon preference, tumor location and accessibility (anterior vs posterior), proximity to other abdominal organs, and patient habitus and comorbidities.

During laparoscopic ablative surgery, the thermal probe is routinely placed through a separate skin incision to access the renal tumor. Although no case reports of tract-site recurrences have been noted after probe-ablative nephron-sparing surgery, a theoretical risk of tract contamination exists. Case reports of tract recurrence for renal cell carcinoma after laparoscopic nephrectomy have been reported,4,5 with greater risk noted in morcellated specimens and cases where extraction was done without a plastic bag6 To reduce the number of skin incisions and eliminate tract exposure to the needle probe, we describe the use of Bone Wax (Tyco/Syneture, Mansfield, MA, USA) to provide an airtight seal of a 5-mm laparoscopic port.

METHOD

The technique used for laparoscopic renal ablation (cryotherapy and RFA) has previously been described.5,7 The main steps can be summarized as establishment of transperitoneal or retroperitoneal access, laparoscopic dissection for tumor exposure, laparoscopic ultrasonography followed by Tru-cut needle biopsy8 of the renal mass. Thereafter, Bone Wax was used to completely occlude the external opening of one of the established 5-mm laparoscopic ports (Ethicon Endo-Surgery, Somerville, NJ), which would provide optimal tumor access (Figure 1). Placement of either the cryoprobe or the RITA StarBurst (RITA Medical Systems, Fremont, CA) ablation probe through the 5-mm port was successful in all patients while pneumoperitoneal pressure was maintained. Additional
Bone Wax was applied along the shaft of the probe to ensure an airtight seal once the thermal-needle was appropriately positioned into the center of the tumor (Figure 2). Following the treatment cycles, the ablation probe was withdrawn under laparoscopic guidance into the 5-mm port canal. The 5-mm port and the probe were removed together from the abdominal wall, thus eliminating any contact with the skin tract. A new 5-mm port was repositioned into the surgical space by using the same skin tract. FloSeal (Baxter International, Deerfield, IL) and argon beam coagulation were then used to ensure hemostasis before case completion.

RESULTS

We have used the Bone Wax sealant to aid with thermal probe positioning during laparoscopic ablative procedures. All treatments were successfully performed through previously established 5-mm laparoscopic ports while maintaining pneumoperitoneal pressure. A separate skin puncture was not required, and the ablation probe was never in contact with subcutaneous tissues of the abdominal wall.

DISCUSSION

Minimally invasive tissue ablative procedures are evolving into an appropriate treatment option for managing small and exophytic renal tumors in select patients. The laparoscopic approach to these modalities often requires the placement of the thermal probe through a separate skin incision to maintain pneumoperitoneal pressure. Although rare, removal of the probe through the skin tract after lesion treatment may increase the potential for tumor cell transfer and port-site contamination. Our described technique using Bone Wax has proved useful in utilizing an established 5-mm laparoscopic port and avoiding direct contact of the ablation probe with subcutaneous tissues.

Bone Wax is a sterile mixture of beeswax, paraffin, and isopropyl palmitate, a wax-softening agent. This inexpensive material is often used to achieve local hemostasis of bone by acting as a mechanical barrier, particularly in...
orthopedic and sternotomy procedures. Bone Wax does not act biochemically and is nonabsorbable. Based on its physical properties, it can easily be molded into the external canal of a laparoscopic port and can provide sufficient coaptation around the ablation need to ensure an airtight seal despite pneumoperitoneal pressures of 14 mm Hg to 20 mm Hg.

Despite its merits, this technique has several limitations. In obese patients, where the abdominal wall may be very thick, distance to the tumor may be a limiting factor. The additional 5 cm to 7 cm that may be gained by having the probe placed directly through the skin rather than through the laparoscopic port may be important in certain individuals. Furthermore, tumors with larger diameters, irregular shapes, and patients with multiple tumors may require placement of several probes to deliver appropriate therapy. As such, the placement of additional 5-mm ports simply for probe insertion would be inappropriate. In these laparoscopic cases, where direct, percutaneous insertion is used, we recommend probe activation in the peritoneal cavity before extraction to eradicate potential tumor cells.

CONCLUSIONS

Use of Bone Wax is a simple, inexpensive technique to avoid separate skin incisions while minimizing tract-site contact with ablation probes.

References:

1. Hegarty NJ, Gill IS, Desai MM, et al. Probe-ablative nephron-sparing surgery: cryoablation versus radiofrequency ablation. *Urology.* 2006;68:7–13.

2. Gill IS, Remer EM, Hasan WM, et al. Renal cryoablation: outcome at 3 years. *J Urol.* 2005;173:1903–1907.

3. Hwang JJ, Walter MM, Pautler SE, et al. Radiofrequency ablation of small renal tumors: intermediate results. *J Urol.* 2004;171:1814–1818.

4. Iwamura M, Tsumura H, Matsuda, et al. Port site recurrence of renal cell carcinoma following retroperitoneoscopic radical nephrectomy with manual extraction without using entrapment sac or wound protector. *J Urol.* 2004;171:1234–1235.

5. Matin SF, Ahrar K, Cadeddu JA, et al. Residual and recurrent disease following renal energy ablative therapy: a multi-institutional study. *J Urol.* 2006;176:1973–1977.

6. Rassweiler J, Tsivian A, Kumar AV, et al. Oncological safety of laparoscopic surgery for urological malignancy: experience with more than 1000 operations. *J Urol.* 2005;169:2072–2075.

7. Gill IS, Novick AC, Soble JJ, et al. Laparoscopic renal cryoablation: initial clinical series. *Urology.* 1998;52:541–543.

8. Rapp DE, Orvieto MA, Sokoloff MH, et al. Use of biopsy sheath to improve standardization of renal mass biopsy in tissue-ablative procedures. *J Endourol.* 2004;18:453–454.