Prostate Cryoablation in Patients With Multiple-component Inflatable Penile Prostheses

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OBJECTIVE To evaluate and assess any inflatable penile prosthesis (IPP)-related complications in patients with organ-confined prostate cancer treated definitively with third-generation, ultrasound-guided prostate cryoablation.

MATERIAL AND METHODS From November 2003 to October 2010, we identified 100 consecutive patients with clinically organ-confined prostate cancer who were treated with targeted cryoablation as primary or salvage therapy by a single surgeon. Review of these patients revealed 13 who had previously been diagnosed with organic erectile dysfunction and had been implanted with a multiple-component IPP by the same surgeon. To assess IPP complications related to the cryoablation procedure, we retrospectively reviewed events occurring within a 6-month postoperative follow-up period.

RESULTS For the entire series, the patient ages ranged from 42-84 years (mean 68). Of the 13 patients with IPPs, no device-related complication (eg, IPP infection, erosion, or malfunction) was found. No patient required IPP revision or removal.

CONCLUSION Patients with organ-confined prostate cancer who also have a multiple-component IPP may safely undergo ultrasound-guided prostate cryoablation as definitive therapy. Cryoprobe and thermocouple placement must be carried out carefully, using ultrasound guidance. To avoid IPP reservoir injury, suprapubic tube placement should be avoided. UROLOGY 79: 722–724, 2012.

More than 192,000 men in the United States are diagnosed with prostate cancer annually.[1] Most are diagnosed with organ-confined disease, and the majority are treated with radical prostatectomy or some form of radiotherapy. However, some men elect to undergo cryoablation as definitive treatment. In 2008, an American Urological Association Best Practice Statement recognized cryoablation of the prostate as an established treatment option for men with newly diagnosed or radio-recurrent organ-confined prostate cancer.[2] Third-generation, ultrasound-guided, argon- and helium-based systems allow reasonably precise cryoprobe and thermocouple placement, rapid freezing and thawing, and careful monitoring of iceball progression.

Prostate cryoablation can be associated with a variety of complications, including urinary incontinence, erectile dysfunction (ED), and fistula formation.[3] Placement of cryoprobes, thermocouples, and a urethral warmer all have the potential to damage an adjacent inflatable penile prosthesis (IPP). To our knowledge, there is little published data concerning the feasibility or advisability of carrying out prostate cryoablation on men who have an IPP. In this article, we reviewed intraoperative and postoperative IPP-related complications in a large series of men treated with targeted prostate cryoablation.

MATERIAL AND METHODS

Between November 2003 and October 2010, 100 consecutive men with clinically organ-confined, biopsy-proven prostate cancer were identified from our prostate cryoablation database. Seventy-seven patients underwent primary cryoablation, and 23 underwent salvage cryoablation after failing radiation therapy. Of this cohort, 13 patients were identified as having a normally functioning, multiple-component IPP (Mentor Alpha I or Coloplast Titan models), which had been implanted by the primary author.

Men with newly diagnosed prostate cancer did not undergo preoperative bone scans or cross-sectional imaging unless their prostate-specific antigen (PSA) level was >20 ng/mL or their Gleason score was ≥7. Patients considered for salvage treatment had a rising PSA after radiotherapy; all underwent repeat prostate biopsy for histologic confirmation and had no evidence of metastasis on bone scan and cross-sectional imaging. All patients underwent preoperative flexible office cystoscopy, and all completed a mechanical bowel prep. No preoperative imag-

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ing was specifically carried out to document the position of the IPP components.

All cryoablation procedures were performed by a single surgeon. After induction of general endotracheal anesthesia, patients were placed in a relaxed dorsal lithotomy position. All received prophylactic intravenous cefazolin before induction, regardless of their IPP status. Chlorhexidine gluconate was used for skin preparation. The scrotum was retracted cephalad, and IPPs were completely deflated. Ten milliliters of 2% lidocaine jelly were instilled per urethra, a 16-Fr catheter was inserted into the bladder, and the bladder was emptied and then filled with 100 mL of sterile saline solution. Using a stabilizing device attached to the rail of the operating table, a transrectal ultrasound probe was placed on a brachytherapy-type sled and introduced *per rectum*. Transverse and longitudinal ultrasound images of the prostate were obtained. HealthTronics software and equipment (Endo Pharmaceuticals, Newark, DE) were used to develop a treatment plan, generally using 6 cryoprobes and 6 thermocouples. Using transverse and longitudinal ultrasound guidance and a brachytherapy-type grid, thermocouples were inserted into the right and left neurovascular bundles, Denonvilliers' fascia, the membranous urethra, the prostatic apex, and the anterior prostate. Cryoprobes were inserted according to the treatment plan. After placement of all probes, the urethral catheter was removed and flexible cystoscopy was carried out. Any intraluminal hardware was repositioned, and proper placement confirmed cystoscopically. Thereafter, a guidewire was placed into the bladder, the cystoscope was removed, and a well-lubricated urethral warmer was placed into the bladder over the guidewire, which was then removed. The urethral warmer was set at 42°C.

All patients (primary and salvage) underwent 2 complete whole-gland freeze-thaw cycles, with continuous transverse and longitudinal ultrasound monitoring. Argon gas was used for rapid freezing of the cryoprobes, and helium gas for rapid thawing. The prostate was frozen down to the anterior rectal wall. After the second thaw cycle was completed, all the cryoprobes and thermocouples were removed, the urethral warming catheter was removed, and a 16-Fr urethral catheter was inserted and left in place for 4-5 days.

Follow-up and assessment of any IPP-related complications was via retrospective chart review. A 6-month postoperative time frame was chosen to allow sufficient time for any device-related complications to become evident.

RESULTS

Of the 100 consecutive men who comprised our cryoablation series, the patients' ages ranged from 42-84 years (mean 68). PSA levels ranged from 0.1-17.4 ng/mL (mean 7.7). Of the 100 patients, 13 (13%, ages 61-72) had previously undergone IPP implantation for organic ED. Primary cryoablation was performed in 77 patients, and salvage cryoablation in 23. Of the 13 patients with an IPP, 10 underwent primary cryoablation and 3 underwent a salvage procedure. Postoperative patient follow-up ranged from 6 months to 7.2 years (mean 4.7 years). During the follow-up period, one patient who had an IPP died from a traumatic injury >5 years after his procedure. No patient developed IPP infection, erosion, malfunction, or any other IPP-related complication within the 6-month postoperative assessment period, and no patient required revision or removal of their IPP.

COMMENT

This retrospective review revealed no intraoperative or postoperative device-related complications in 13 patients who underwent prostate cryoablation for organ-confined prostate cancer, after IPP insertion. Other large series of prostate cryoablation procedures have been largely silent on this topic.[3-7] Our literature search yielded only one case report of a patient undergoing prostate cryosurgery in the presence of a penile prosthesis.[8] This patient was followed for 2 months postoperatively; no device-related complications were reported.

In patients who have a multiple-component IPP, there is potential for device damage and infectious complications during prostate cryoablation. Six sharp cryoprobes and 6 equally sharp thermocouples must be inserted through the perineum into precisely selected areas of the prostate. Imprecise insertion of these probes could potentially damage the proximal IPP cylinders. Failure to sufficiently retract the scrotal pump mechanism could lead to a pump or tubing injury. The IPP reservoir is also within reach of these sharp probes. Urethral catheter drainage is also required for a variable period after prostate cryoablation; this could potentially predispose to cylinder erosion into the urethra. We believe that careful probe placement, under direct ultrasound guidance, is paramount in any cryoablation procedure involving a patient with an IPP. Suprapubic tube (SPT) placement should be avoided in patients with an IPP; an SPT can directly injure the IPP reservoir, or introduce bacteria into the IPP capsule or surrounding tissues. The urethral catheter should be removed as soon as possible to limit the risk of cylinder erosion into the urethra. Bowel preparation, careful skin preparation, and prophylactic antibiotics are recommended in these patients to avoid perineal cellulitis, which could extend to involve the IPP. To our knowledge, there are no cryoablation equipment manufacturers' recommendations regarding patients with IPPs.

The primary limitations to this study are its retrospective nature and the small number of patients available for review. However, our series indicates that prostate cryoablation can be performed safely in this patient population.

CONCLUSIONS

With appropriate attention to surgical techniques, targeted primary or salvage prostate cryoablation may be performed safely in men with a multiple-component IPP

who have been diagnosed with organ-confined prostate cancer.

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