THE JOURNAL OF
SEXUAL MEDICINE

ORIGINAL RESEARCH

Three-Piece Inflatable Penile Prosthesis Placement Following Pelvic Radiation: Technical Considerations and Contemporary Outcomes

Jeffrey Loh-Doyle, MD,[1] Mukul B. Patil, MD,[2] Zein Nakhoda, MD,[1] Nima Nassiri, MD,[1] Wesley Yip, MD,[1] Kevin Wayne, PA-C,[1] Leo Doumanian, MD,[1] and Stuart D. Boyd, MD[1]

ABSTRACT

Background: Pelvic radiation is a known risk factor for the development and progression of erectile dysfunction. When medical therapy fails, the 3-piece inflatable penile prosthesis (IPP) can offer patients a definitive treatment option. Because of radiation-induced vascular changes and tissue fibrosis, a careful surgical approach is necessary to avoid intraoperative complications and attain successful outcomes. Despite its widespread use in prostate cancer treatment, there are no contemporary studies examining the effects that pelvic radiation can have on 3-piece IPP placement and device survival.

Aim: To present technical considerations and contemporary outcomes of placing a 3-piece IPP for refractory erectile dysfunction in patients with a history of pelvic radiation.

Methods: We retrospectively reviewed 78 patients who underwent placement of a 3-piece IPP (AMS 700; Boston Scientific, Marlborough, MA, USA) after being treated with pelvic radiotherapy from 2003 through 2016. All patients had been treated with external beam and/or brachytherapy for treatment of prostate malignancy. An infrapubic approach was used in all patients, with reservoir placement in the space of Retzius or in the lateral retroperitoneal space. Patient demographics, perioperative data, and postoperative outcomes including prosthetic infection and mechanical failure were examined and statistical analysis was performed.

Outcomes: Rates of device infection, revision surgery, and reservoir complications.

Results: No intraoperative complications were observed. After a mean follow-up of 49.0 months (6.6−116.8), 2 patients developed an infection of their prosthesis that required explantation. These patients underwent successful IPP removal and immediate reimplantation. 11 patients (14.1%) required revision surgery (pump replacement, n = 4; pump relocation, n = 2; cylinder replacement, n = 4; reservoir replacement owing to leak, n = 1). No reservoir-related complications such as herniation or erosion into adjacent structures were observed.

Clinical Implications: The 3-piece IPP can be placed safely in a broad range of patients treated with pelvic radiotherapy.

Strengths and Limitations: This study describes contemporary long-term outcomes of the IPP in patients treated with pelvic radiation and includes patients with prior pelvic surgery and artificial urinary sphincter, which are commonly encountered in practice. It is limited by its single-center experience and lacks a comparison group of patients. Objective patient satisfaction data were not available for inclusion.

Conclusions: The 3-piece IPP can be placed successfully in patients with a history of pelvic radiation without a significant increase in infectious complications, reservoir erosion, or mechanical failure compared with the global literature. **Loh-Doyle J, Patil MB, Nakhoda Z, et al. Three-Piece Inflatable Penile Prosthesis Placement Following Pelvic Radiation: Technical Considerations and Contemporary Outcomes. J Sex Med 2018;XX:XXX−XXX.**

Key Words: Erectile Dysfunction; Inflatable Penile Prosthesis; Radiation Therapy; Brachytherapy; Salvage Prostatectomy

Received February 17, 2018. Accepted April 13, 2018.

[1]USC Institute of Urology, USC/Norris Comprehensive Cancer Center, Keck School of Medicine, University of Southern California, Los Angeles, CA, USA;

[2]Tricounty Urology Associates, Washington, PA, USA

https://doi.org/10.1016/j.jsxm.2018.04.634

INTRODUCTION

Erectile dysfunction (ED) continues to be a significant side effect of radiotherapy.[1−4] Although the effects of radiation therapy on tissue are complex and only partly understood, studies have shown that radiation leads to several pathologic changes in tissue, including small vessel obliteration, tissue atrophy, and

fibrosis.[5] It has been hypothesized that these mechanisms damage the neurovascular bundles and injure the corporal endothelium and trabecular smooth muscle, leading to ED.[6,7] These effects are magnified in patients with medical comorbidities or who have undergone radical prostatectomy.[8,9] Although some patients can respond to conservative treatments, there are a significant number of patients who are refractory and will require surgical treatment.

Despite being the gold standard treatment for refractory ED, the effect of radiation therapy on the outcomes of the 3-piece IPP is unknown. We know from several studies examining the artificial urinary sphincter (AUS) that there is an increased rate of device failures, including infection and erosion, in patients who have been treated with radiation.[10–12] What is less understood is whether this risk also is applicable to penile prosthetic implantation. Because of radiation-induced fibrotic changes and effects on tissue vascularity, there is the potential for increased risk of intraoperative complications, adjacent organ injury during reservoir placement, and device infection.

The goal of this study was to address these questions by presenting our preoperative assessment, surgical approach, and contemporary long-term outcomes of 3-piece inflatable penile prosthesis (IPP) placement in patients who were treated with pelvic radiotherapy for prostate cancer.

METHODS

Using a prospectively maintained urologic prosthetics database approved by the institutional review board, we identified 78 patients from 2003 through 2016 who had been treated with radiotherapy for treatment of prostate carcinoma and subsequently underwent placement of a 3-piece IPP (AMS 700; Boston Scientific, Marlborough, MA, USA). All surgeries were performed at our institution by 2 surgeons (L.R.D. and S.D.B.).

Patients were included in the study if they underwent IPP placement and had been treated with external beam, implantable seeds, or a combination of radiation therapy modalities. No patients received radiation therapy after prosthesis placement. All patients had refractory ED and were considered for device implantation after failure of conservative treatments, such as the vacuum erection device, oral medications, and intracavernosal injection therapies. Patients were excluded from statistical analysis if they had follow-up duration shorter than 6 months.

Preoperative Preparation

To minimize the risk of intraoperative and perioperative complications, a detailed medical and surgical history is the 1st step in judicious preoperative planning. This includes an evaluation of medical comorbidities including those that would exclude patients from eligibility such as uncontrolled diabetes and active infection. Small increases in prostate-specific antigen found during post-treatment screening are not considered a contraindication to IPP placement. The patient's surgical history is reviewed, paying close attention to those involving the abdomen and pelvis.

Patients with an AUS require closer scrutiny because of the risk of urethral compression from the corporal cylinders.[13] Before IPP implantation, an accurate determination of AUS component sizes, timing of device placement and most recent revision, and whether the patient had previous urethral surgery for stricture disease is essential. Patients are informed of the risk of complications to the sphincter and urethra and potential need for revision surgery.

Day of Surgery

Atraumatic hair removal, drainage of the urinary bladder, alcohol-based skin preparation and scrub, and isolation of stomas using polyethylene sterile drape sheets are performed before preparation and incision. Intravenous vancomycin and gentamicin are used for perioperative prophylaxis.

Intraoperative Considerations

The cylinders and pump are placed through an approach (infrapubic vs penoscrotal) depending on surgeon preference. Through an infrapubic incision, electrocautery is used to dissect through subcutaneous fat tissue and Dartos fascia. The 2 corpora are identified and delineated with a finger-sweep motion. Stay sutures are placed and the corpora are incised. During this initial dissection, one should be mindful of AUS tubing location and efforts should be made to avoid their exposure.

Corporal Dilation

One can encounter the effects of radiation during proximal corpora cavernosal dilation. In some patients, the corpora cavernosa can be fibrotic and overly aggressive dilation could lead to proximal crural perforation. To avoid this, careful and cautious sequential dilation is necessary if fibrosis is encountered. When there is fibrosis, alternating between large and small Hegar dilators can help the corpora accommodate dilation and ensure proper proximal dilation to the ischiopubic rami. In patients with an AUS, proximal dilation must be done conscientiously because of the presence of the urethral cuff. There is often a "step-off" that is encountered and must be overcome gently to achieve complete proximal dilation. The distal corpora do not tend to have the same degree of fibrosis and dilation can typically be performed as one is normally accustomed to.

Cylinder and Pump Placement

The cylinders (with rear-tip extenders) are placed in each corpus using a Keith needle and the corporotomies are closed with 3-0 polydioxanone running suture. The quality of the erection is tested using a 60-mL syringe as a surrogate reservoir. To place the pump, a subdartos pocket is developed and the pump is placed inferiorly and in a dependent position within the scrotum. A shod is placed at skin level and the excess is tubing is cut.