

Prostatic Diseases and Male Voiding Dysfunction

Outcomes After Photoselective Vaporization of the Prostate and Transurethral Resection of the Prostate in Patients Who Develop Prostatic Obstruction After Radiation Therapy

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OBJECTIVE	To compare the need for repeat treatment or urinary diversion in patients undergoing transurethral resection of the prostate (TURP) compared with photoselective vaporization of the prostate (PVP) after brachytherapy or external beam radiation therapy (EBRT).
METHODS	The prostate cancer database of Cleveland Clinic includes 3600 patients who have undergone prostate brachytherapy and 2500 patients who have undergone EBRT. We cross-referenced these patients with the electronic medical record to identify patients who required PVP or TURP after radiation. The primary outcome was the need for any further intervention after PVP or TURP, including bladder neck incision, repeat TURP, or permanent suprapubic diversion.
RESULTS	Sixty of the 3600 patients (1.7%) required prostate reduction surgery after brachytherapy. Of these 60 patients, 19 of 40 (47.5%) who underwent TURP required further intervention, and 10 of 20 patients (50%) who underwent PVP required subsequent intervention. Twenty-eight of the 2500 patients (1.1%) required prostate reduction surgery after EBRT. Of these 28 patients, 5 of 18 patients (27.8%) who underwent TURP required further intervention, and 5 of 10 patients (50%) who underwent PVP required subsequent intervention. Following either type of radiation there was not a significant difference in the need for further treatment based on the type of surgery ($P > .999$ for brachytherapy; $P = .412$ for EBRT). The median time between radiation and prostate reduction surgery is 20.2 months (range, 14.6-27.6) after brachytherapy and 53.3 months (range, 27.5-53.3) after EBRT ($P = .0005$).
CONCLUSION	This study suggests that PVP and TURP are comparable in treating prostatic obstruction after brachytherapy or EBRT. However, obstruction after brachytherapy occurs earlier compared with after EBRT. UROLOGY 83: 422-427, 2014. © 2014 Elsevier Inc.

Patients with prostate cancer who undergo brachytherapy or external beam radiation therapy (EBRT) are at risk of developing chronic urinary retention that requires surgical intervention.^{1,2} Previous studies report that up to 10% of patients require an invasive procedure for urinary complications after brachytherapy, and 2.3%-6.6% of patients require transurethral resection

of the prostate (TURP) for chronic urinary retention after brachytherapy.³⁻⁶ Rates of chronic urinary retention have been reported to be slightly lower after EBRT, occurring in up to 3% of patients.⁷

Surgical management of obstruction after radiation presents a unique challenge, given the reduced healing capacity of irradiated tissue. Standard TURP has historically been the treatment of choice for bladder outlet obstruction after radiation therapy, although reports indicate that up to 70% of these patients develop chronic incontinence after surgery.^{5,8} Furthermore, over 10% of these patients require more than 1 procedure, and TURP performed within 2 years of brachytherapy leads to an even higher rate of subsequent complications.^{1,5}

Photoselective vaporization of the prostate (PVP) has become increasingly popular in the past decade for treating benign prostatic hyperplasia and provides an

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alternative method of intervention for patients who develop obstruction after radiation therapy.⁹ However, anecdotal evidence has supported eliminating PVP as an option, given observations of calcific necrosis contributing to intractable obstruction after PVP.

This study aims to compare the need for repeat treatment or urinary diversion in patients undergoing TURP compared with patients undergoing PVP after radiation therapy.

MATERIALS AND METHODS

Patient Identification

The institutional review board–approved prostate cancer database of Cleveland Clinic includes 3600 patients who have undergone prostate brachytherapy since 1996 and 2500 patients who have undergone EBRT since 1986. The prostate cancer database is a prospectively maintained database containing clinical, treatment, and follow-up information for all patients treated with radiation therapy from 1986 to present. We cross-referenced these patients with our electronic medical record (EMR) to identify patients who required prostate reduction surgery after brachytherapy or EBRT.

After identifying the patients who required surgical procedures, we reviewed operative notes to confirm the type of intervention that was completed, allowing us to dichotomize the patients into 2 groups: those who received traditional TURP (monopolar or bipolar), and those who received a greenlight laser ablation procedure (PVP). The choice of therapy was at the discretion of the treating physician. Cystoscopic findings at follow-up visits and complications requiring further intervention after TURP or PVP were recorded. The primary outcome measure was the need for “any further intervention,” which included bladder neck incision, TURP, or urinary diversion (suprapubic tube or permanent suprapubic diversion) after TURP or PVP. Clinical and demographic characteristics were obtained from the prospective database and the EMR.

The EMR and available outside records were reviewed to identify the number and type of further interventions. All procedure notes, office notes, and operative notes were reviewed to optimize the identification of required procedures.

Data Analysis

Baseline characteristics, including body mass index, prostate volume, age at radiation, and time between radiation and the initial procedure were compared between patients who underwent TURP and those who underwent PVP. The Mann-Whitney *U* test was used to compare continuous data, and Fisher's exact test for comparing categorical data between the 2 groups. The proportion of patients requiring further interventions in the PVP and TURP groups was compared using Fisher's exact tests. Logistic regression was used to examine if time between radiation and the initial procedure correlated with the need for additional procedures. Statistical significance was considered as $P < .05$.

RESULTS

Brachytherapy

There were 3600 patients who received prostate brachytherapy between 1996 and 2012 at Cleveland Clinic. Our

EMR search revealed 60 patients (1.7%) who subsequently required surgical intervention for urinary obstruction, including 40 patients who underwent TURP and 20 patients who underwent PVP (Fig. 1).

Baseline characteristics of patients who underwent PVP or TURP did not differ significantly (Table 1). Patients underwent TURP at a median of 20.9 months after brachytherapy (range, 12.6-33.9) and PVP at a median of 20.7 months after brachytherapy (range, 18.4-26.1). The time between brachytherapy and prostate reduction surgery did not correlate with outcome ($P = .8991$). Mean follow-up was 5.4 years for the TURP patients and 6.7 years for the PVP patients.

Of the 40 TURP patients, 19 (47.5%) required subsequent intervention, including 9 patients (22.5%) who required at least 2 further procedures. Indications for TURP included retention or obstructive symptoms (36 patients), hematuria (2 patients), and infection/abscess (2 patients). Of the PVP-treated patients, 10 of 20 (50%) required subsequent instrumentation, including 4 (20%) who underwent at least 2 procedures. Indications for PVP included retention or obstructive symptoms (19 patients) and recurrent urinary tract infections (1 patient). Three patients (3 of 40, 7.5%) who underwent TURP required 4 or more procedures after their initial surgery, including 1 patient who underwent permanent diversion with an ileal conduit. One patient (1 of 20, 5%) who underwent PVP required 4 or more procedures, eventually requiring 3 bladder neck incisions, 1 TURP, and an artificial urinary sphincter implantation. There was no statistically significant difference in the need for repeat procedures based on whether the patient initially underwent TURP or PVP ($P > .9999$).

The risk of chronic incontinence after prostate reduction surgery was not significantly different between the patients who underwent TURP and those who underwent PVP ($P = .7833$). Sixteen of 40 patients who underwent TURP (40%) developed chronic incontinence (more than 1 year after TURP), and 7 of 20 patients who underwent PVP (35%) developed chronic incontinence.

External Beam Radiation Therapy

There were 2500 patients who received EBRT between 1986 and 2012 at the Cleveland Clinic. Twenty-eight patients (1.1%) subsequently required surgical intervention for urinary obstruction, including 18 patients who underwent TURP and 10 patients who received PVP (Fig. 2).

Baseline characteristics between patients who underwent PVP or TURP did not differ significantly (Table 1). Patients underwent TURP at a median of 55 months (range, 25-80) and PVP at a median of 45 months (range, 22-53). The time between EBRT and prostate reduction surgery did not correlate with outcome ($P = .7091$). Mean follow-up was 8.7 years for TURP patients and 8.2 years for PVP patients.

Of the 18 TURP patients, 5 (28%) required subsequent intervention, including 1 patient who required 2 further

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