Population Based Comparative Effectiveness of Transurethral Resection of the Prostate and Laser Therapy for Benign Prostatic Hyperplasia

Seth A. Strope,* Liu Yang, Kenneth G. Nepple, Gerald L. Andriole† and Pamela L. Owens

From the Division of Urology, Department of Surgery (SAS, LY, KGN, GLA), Division of Infectious Disease, Department of Internal Medicine (PLO) and Center for Administrative Data Research (PLO), Washington University, St. Louis, Missouri

Purpose: As the American population ages, benign prostatic hyperplasia and its associated lower urinary tract symptoms have become increasingly important causes of chronic morbidity. We assessed the comparative effectiveness of 2 common forms of surgical therapy, transurethral prostate resection and laser therapy, for benign prostatic hyperplasia.

Materials and Methods: Using patient level discharge data and revisit files from the Agency for Healthcare Research and Quality we evaluated a cohort of patients who underwent transurethral prostate resection or laser therapy for benign prostatic hyperplasia in 2005 in California. Short-term outcomes, including in hospital complications, length of stay, 30-day rehospitalization, 30-day repeat surgery and 30-day emergency room visits, were compared between the therapies by regression analysis. Long-term re-treatment, defined as the absence of secondary procedures for benign prostatic hyperplasia or complications of therapy, was assessed by survival analysis. Analysis was adjusted for medical comorbidity, race, age and insurance status.

Results: Data on 11,645 hospital discharges showed that mean length of stay was shorter for laser therapy than for transurethral prostate resection (0.70 vs 2.03 days, $p < 0.0001$). The 30-day repeat visit occurred in 16% of laser and 17.7% of resection cases ($p = 0.0338$). The 4-year re-treatment rate was 8.3% for resection and 12.8% for laser therapy ($p < 0.0001$). After adjustment patients with resection were 37% less likely to require repeat therapy than those with laser therapy (HR 0.64, $p < 0.0001$).

Conclusions: Laser procedures and transurethral prostate resection provide effective management of benign prostatic hyperplasia/lower urinary tract symptoms. Laser procedures are associated with less need for hospitalization than transurethral prostate resection but appear to involve a trade-off in long-term efficacy.

Key Words: prostate, prostatic hyperplasia, urination disorders, transurethral resection of prostate, laser therapy

Abbreviations and Acronyms

AHRQ = Agency for Healthcare Research and Quality

BPH = benign prostatic hyperplasia

HCUP = Healthcare Cost and Utilization Project

LOS = length of stay

TURP = transurethral prostate resection

Submitted for publication August 9, 2011.

Study received Washington University, St. Louis, Missouri institutional review board approval.

Supported by Washington University KL2 Career Development Awards Program KL2 RR024994 and Barnes Jewish Hospital Foundation/ICTS Clinical and Translational Science Research Award UL1 RR024992 (SAS).

* Correspondence: Division of Urologic Surgery, Washington University School of Medicine, 4960 Children's Pl., Campus Box 8242, St. Louis, Missouri 63110 (telephone: 314-454-8039; FAX: 314-454-5244; e-mail: stropes@wudosis.wustl.edu).

† Financial interest and/or other relationship with Amarex, Amgen, Augmenix, Bayer, Bristol Myers Squibb, Cambridge Endo, Envisioneering Medical, France Foundation, GenProbe, GlaxoSmithKline, Myriad Genetics, Steba Biotech, Ortho-Clinical Diagnostics and Viking Medical.

For another article on a related topic see page 1498.

As the American population ages, BPH and its associated lower urinary tract symptoms become increasingly important causes of chronic morbidity. To confront the morbidity of symptomatic BPH new therapies have been developed and promulgated into practice. These minimally invasive surgical therapies provide benefits over traditional surgery that may increase the

0022-5347/12/1874-1341/0
THE JOURNAL OF UROLOGY®

Vol. 187, 1341-1345, April 2012
Printed in U.S.A.
DOI:10.1016/j.juro.2011.11.102

efficiency of surgical care for men with BPH. However, little long-term data exist on the efficacy and complications of these new therapies compared to the gold standard of TURP.

One such minimally invasive surgical treatment is laser therapy, which is increasingly marketed as a replacement for TURP. Published improvements of laser therapy over traditional TURP include lower blood loss,[1,2] shorter hospital stay,[3] ability to treat larger glands[4,5] and elimination of the risk of transurethral resection syndrome.[6] Despite these advantages few studies document the long-term outcome of laser therapy. Those that do are single institution studies and may not reflect the experience of patients outside select centers where there is greater technological expertise.

We compared the effectiveness of TURP and laser therapy for BPH in real world settings. We hypothesized that laser therapy would be associated with a shorter stay and fewer 30-day complications while TURP and laser therapy would have equal long-term durability.

METHODS

Study Cohort

Using data from the HCUP of the AHRQ we evaluated a cohort of patients 40 years old or older treated with surgical therapy for BPH in 2005 with followup through 2009. BPH was defined by ICD-9 diagnosis codes. We excluded patients with genitourinary cancer or surgical therapy in 2004. Using ICD-9 and CPT codes we identified patients treated with TURP and laser prostatectomy at hospitals and ambulatory surgical centers. HCUP provides an all payor discharge level collection of hospitalizations (State Inpatient Database),[7] outpatient surgeries (State Ambulatory Surgery Database)[8] and emergency room visits (State Emergency Department Database)[9] from participating states. We used California State Inpatient Database, State Ambulatory Surgery Database and State Emergency Department Database data since information on inpatient surgery, outpatient surgery (hospital based and at freestanding ambulatory surgical centers)[10] and emergency room visits were available from these sources. We then used AHRQ revisit files to create linkages at the patient level across inpatient, ambulatory surgical and emergency department practice settings and years.[11]

Revisit files link patients across the data sets based on date of birth, gender and an encrypted patient identifier. The revisit file provides information about the time from one event to another in the State Inpatient Database while keeping the date of a service encrypted. A limitation of revisit files is they only provide data on patients in an individual state. Thus, any patient care done across state lines cannot be tracked with this data. The unique population distribution of California with few population centers near other states provides an advantage when using the revisit files. We followed our cohort of surgically treated patients for short-term and long-term outcomes using the revisit files.

Outcomes

Perioperative outcomes of laser therapy and TURP were examined. These short-term outcomes included the LOS of the initial procedure, complications during the initial ambulatory surgery center or hospital stay, additional ambulatory surgical procedures within 30 days of the initial surgery or hospital discharge, visits to emergency rooms within 30 days of surgery or hospital discharge and readmission to a hospital within 30 days of surgery or hospital discharge. LOS was assessed directly from HCUP records. Possible complications during and after the initial surgery were ascertained using AHRQ published Patient Safety Indicators.[12] The 30-day readmission, repeat surgery and emergency room visits were assessed using the revisit files linked to inpatient, ambulatory surgery and emergency room data files. Indicator variables were created for these variables.

Our primary outcome was the long-term efficacy of surgical therapy for BPH, as assessed by the receipt of repeat surgical therapy. To provide a broad selection of possible secondary therapies we included procedures for BPH and for possible complications of therapy, such as anti-incontinence or stricture procedures. To protect privacy the HCUP database does not contain real date on procedures or hospitalizations. Thus, for patients with repeat surgery the time from initial surgery to repeat surgery was calculated using revisit files. For patients without repeat surgery we calculated the maximum followup based on the month and year of the initial procedure through the final date of the data (December 31, 2009).

Exploratory Variables

Procedures were classified as TURP or laser therapy. Due to ICD-9 and CPT coding all types of laser therapy, including contact and noncontact vaporization, and enucleation, are included as laser therapy. Patient comorbidities were assessed from ICD-9 codes found on the surgical discharge record and enhanced by examining data on hospitalizations for 1 year before the surgery discharge. Comorbidity coding was done by applying the methods of Elixhauser et al.[13] Patient demographics were based on the record from the index surgical procedure. Patient race was categorized as white, black, Hispanic or other. Patient age was categorized into 5-year age ranges, including less than 50, 50 to 54, 55 to 59, 60 to 64, 65 to 69, 70 to 74, 75 to 79, or 80 years or greater. Payor status was categorized as commercial insurance, Medicare, Medicaid/self-pay or other.

Statistical Analysis

Differences in LOS between the TURP and laser therapy groups were compared by linear regression analysis. Logistic regression analysis was used to assess for differences between treatments in hospital readmissions, repeat ambulatory surgery visits, emergency room visits and complications. Each perioperative outcome was assessed in individual models without confounding variables and then when controlling for differences in comorbidity, race, age and payor status between the therapy types. Since inpatient vs outpatient service setting can influence the coding of comorbidity and complication data, we reexamined the results, stratified by site of the initial surgery.