

Photoselective Laser Vaporization Prostatectomy Versus Transurethral Prostate Resection: A Cost Analysis

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Purpose: Laser procedures to treat symptomatic benign prostatic hyperplasia are becoming more common despite concern for potentially increasing cost burdens often associated with new technologies.

Materials and Methods: Actual costs associated with photoselective laser vaporization prostatectomy and transurethral prostate resection were measured using the EPSi™ and TSI (Eclipsys®) hospital cost accounting systems at 2 large tertiary referral centers for the first 12 months that GreenLight HPS™ was performed. Only patients who presented for photoselective laser vaporization prostatectomy or transurethral prostate resection as the principal treatment during the hospital visit were included in study.

Results: A total of 250 men underwent transurethral prostate resection and 220 underwent photoselective laser vaporization prostatectomy, including 194 (78%) and 209 (95%), respectively, treated on an outpatient basis with less than 23 hours of hospitalization. Overall costs of laser vaporization were lower than those of transurethral prostate resection ($\$4,266 \pm \$1,182$ vs $\$5,097 \pm \$5,003$, $p = 0.01$). Average inpatient length of stay was also longer in the resection group.

Conclusions: The actual costs of photoselective laser vaporization prostatectomy at our affiliated hospitals are lower than those of transurethral prostate resection. The primary reason is likely that most patients who undergo laser vaporization are treated on an outpatient basis compared to those who undergo resection. While significant complications are uncommon, those that prolong inpatient hospitalization such as hyponatremia (transurethral resection syndrome), which is associated with transurethral prostate resection but not with photoselective laser vaporization prostatectomy, can add substantial expense. Further studies are warranted to investigate these findings on a broader scale.

Key Words: prostate; urinary bladder neck obstruction; lasers, solid-state; transurethral resection of prostate; costs and cost analysis

BENIGN prostatic hypertrophy is a significant disease in aging men. When BPH is symptomatic, it can cause substantial disruption of daily activities and sleep patterns, resulting in decreased quality of life.¹ By histological criteria almost 3/4 men will have BPH by the seventh decade of life.² The high BPH prevalence is a significant medical and financial burden to the patient and society. In 2000 almost 4.5 million vis-

its to physician offices were made for the primary diagnosis of BPH with a direct treatment cost of about \$1.1 billion, excluding the cost of outpatient medication.³ Advances in medical therapy have decreased the number of surgical interventions, inpatient hospitalizations and LOS related to BPH but, when symptoms are severe or refractory to medical management, surgical intervention is still required.

Abbreviations and Acronyms

BPH = benign prostatic hyperplasia

LOS = length of stay

PVP = photoselective laser vaporization prostatectomy

TUR = transurethral resection

TURP = TUR of the prostate

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Historically TURP has been considered the gold standard to alleviate bladder outlet obstructing related to BPH. Although it is decreasing in frequency, TURP is still one of the most common procedures done. Complications are rare but may be severe. A contemporary series showed a 3.8% intraoperative blood transfusion rate, a 1.6% TUR syndrome rate and a 0.9% severe anesthetic event rate.⁴ In the last decade minimally invasive surgical therapies have been explored to minimize complications and maximize clinical efficacy. PVP with the GreenLight laser has been increasingly done as an alternative to TURP for symptomatic BPH. Several studies showed comparable functional short-term and intermediate outcomes, and a superior safety profile for PVP vs TURP.⁵⁻⁷ With better hemostasis during tissue vaporization patients at high risk, such as those with severe medical comorbidities, intrinsic coagulopathy or concurrent medical anticoagulation, are amenable to PVP.^{8,9}

When incorporating any new technology into clinical practice, concerns for potentially increased cost burdens arise. In a political environment that is increasingly concerned about health care costs the actual costs of new technology warrant scrutiny and further evaluation. Despite the recent rapid adoption of PVP there are limited data on actual costs compared to those of TURP. Stovsky et al reported that PVP is less costly than TURP based on an economic simulation model.¹⁰ To address this question we compared the actual cost differences between PVP and TURP in a large metropolitan medical center, and identified significant factors that influence the costs associated with these surgical interventions.

MATERIALS AND METHODS

With institutional review board approval we retrospectively examined the actual perioperative hospital costs of patients who underwent TURP or PVP during the first 12 months (2007 to 2008) that GreenLight HPS was done at 2 tertiary private affiliate hospitals in Houston, Texas. EPSi and TSI cost management and decision system software was used to measure actual costs associated with the procedure and the immediate perioperative hospital visit. These cost accounting systems combine actual hospital expenses with clinical and financial data to determine the cost of services provided to the patient.¹¹ Costs are assigned based on relative value units associated with the direct cost of the service as well as the indirect cost of supporting departments.

Procedure codes 60.21 and 60.29 for laser induced prostatectomy (PVP) and transurethral prostatectomy (TURP), respectively, were used to identify patients during the study period. Only patients hospitalized for bladder outlet obstruction with TURP or PVP done as the primary procedure within 72 hours of admission were included in analysis. Study exclusion criteria were hospitalization primarily for other medical reasons with secondary treat-

ment with a bladder neck procedure as well as multiple operative procedures done at surgery. All patients with PVP were treated using the 120 W GreenLight HPS system. In patients with TURP resection equipment and technique were chosen at operating surgeon discretion. Monopolar technology was used in almost all TURP cases according to hospital purchasing activity. Outpatient treatment was defined as discharge home within 23 hours of hospitalization. Intent to treat analysis was applied in 2 cases treated with PVP but converted to TURP. These patients were analyzed in the PVP group.

Actual costs associated with PVP and TURP were derived from hospital expenditures and considered the sum of direct and indirect costs generated by the procedure and the related hospital visit. Direct costs were defined by cost accounting software as expenses specifically attributable to patient care service, for example the cost of equipment, disposables, medication, staff and hospital stay. Laser fiber costs reflected the cost of only 1 fiber per procedure according to the manufacturer charge policy. Indirect costs consisted of costs not related to the patient but derived in support of a clinical service, including administration, human resources, medical records, operations and facility costs. Total costs calculated exclude physician professional fees.

Data were captured in Excel® 2007. Statistical analysis was done using R statistical software. Values are shown as the mean \pm SD, and the median and range. Costs were measured in United States dollars. One and 2-sided Student's t tests were used to compare normally distributed data. The Wilcoxon rank sum test was used to analyze data with a nonnormal distribution. The chi-square test was used to compare categorical data. The OR with the 95% CI using the Fisher exact method was generated to express the relative proportion of patients treated on an outpatient basis using PVP vs TURP. A rank score test based on a median regression model was used to compare multiple factors affecting total cost² with $p \leq 0.05$ considered statistically significant.

RESULTS

Actual hospital costs were obtained in 470 patients who met study inclusion criteria and underwent PVP (220) or TURP (250) during the first 12 months of GreenLight HPS use at 2 private affiliate hospitals. Medicare was the insurance provider for 307 of the 470 patients (65%), another 150 (32%) were insured by a private payer and only 13 (3%) were self-pay or used an alternate provider. Table 1 shows no significant difference in the distribution of insurance providers between the 2 study groups (chi-square test $p = 0.50$). Mean age \pm SD of patients in the PVP group was similar to that in TURP group patients (69.1 ± 9.6 and 69.4 ± 9.9 years, respectively, Student's t test $p = 0.73$).

Table 1 also lists hospital visit data. Significantly more men with PVP could be treated on an outpatient basis than those with TURP. In the PVP group 209 of 220 patients (95%) were discharged home

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