



The Impact of Resident Involvement in Male One-stage Anterior Urethroplasties

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OBJECTIVE	To assess the effect of resident involvement in male anterior urethroplasties with regard to perioperative and postoperative outcomes using a large multi-institutional prospectively collected database.
METHODS	Relying on the American College of Surgeons National Surgical Quality Improvement Program Participant User Files (2005-2012), we extracted all entries with Current Procedural Terminology coding for male one-stage anterior urethroplasty in men (54,310). Cases with missing entries on resident involvement were excluded. Descriptive and logistic regression analyses were constructed to assess the impact of trainee involvement (attending only vs resident) on perioperative and postoperative outcomes. Prolonged operative time (pOT) was defined as operative time >75th percentile (>204 minutes).
RESULTS	A total of 235 one-stage urethroplasties were performed during the study period, for which resident involvement was available. Resident involvement was significantly associated with younger patient age ($P = .011$) and patients with a pre-existing diabetic condition ($P = .047$). In univariate analyses, the rate of pOT was significantly higher in the resident involvement group ($P = .027$). In multivariate models, resident involvement was an independent predictor of pOT (odds ratio, 2.4; 95% confidence interval, 1.3-9.7; $P = .035$). There were no differences in 30-day postoperative complications, length of hospital stay, or readmissions. Limitations of the study include inability to adjust for case complexity and type of reconstruction.
CONCLUSION	Resident involvement is associated with pOT for anterior urethral strictures. However, it does not adversely affect complication rates or the length of hospital stay. UROLOGY 85: 937–941, 2015. © 2015 Elsevier Inc.

Strictures are the most common pathology of the anterior male urethra. They represent a substantial proportion of urologic consultations accounting for roughly 5000 inpatient and 1.5 million office visits per year in the United States. The annual health care burden is estimated at \$191 million and is expected to increase by approximately \$7000 per insured patient each year.¹

Depending on stricture length, localization, and prior interventions, surgical approaches range from urethral dilation and internal urethrotomies to one- and multiple-stage surgery, whereas adjunct reconstructive options

include buccal-mucosal and split-thickness grafting.² Presently, the gold standard for urethral strictures ≥ 1 cm is urethroplasty, with most being performed in a one-stage fashion. Meta-analyses and recent studies with extended follow-up suggest overall recurrence-free rates of 73.8%-90% for this technique.^{3,4} These successful rates are believed to be due to referral to high-volume centers with more surgical experience.^{5,6} Nonetheless, an integral aspect of surgical care in teaching hospitals is resident involvement.⁷ Given the increasing focus on patient safety and quality measures on the one hand, hour limitations in residency training and economic efficiency on the other, optimizing resident involvement in reconstructive urologic procedures will be crucial. To our knowledge, there are no studies that have addressed the possible impact of resident involvement on male one-stage urethroplasties outcomes so far. Hence, the aim of our study was to examine the impact of resident involvement on critical postoperative outcomes after male one-stage urethroplasty using data from American College of Surgeons National Surgery Quality Improvement Program (NSQIP).

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METHODS

Data Source

The American College of Surgeons—NSQIP collects a sample of risk-adjusted surgical patient data from member hospitals to facilitate the assessment of outcome measures after surgery. A trained Surgical Clinical Reviewer prospectively collects the NSQIP data from clinical records.⁸ Validated data from patients' medical charts allow quantification of 30-day risk-adjusted surgical outcomes, including postdischarge information.

Study Population

Using Current Procedural Terminology codes, we identified male patients who underwent one-stage urethroplasty for anterior urethral stricture (Current Procedural Terminology code 53410) only. For the purpose of the analyses, we excluded patients with unavailable resident or attending involvement information and female sex ($n = 2$). This resulted in a final population of 235 patients.

Covariates

For each patient, gender, age, body mass index, race, preoperative creatinine, diabetic status, preoperative coronary intervention, and American Society of Anesthesiology physical status were evaluated. Additionally, the highest postgraduate year (PGY) of the resident who was involved in the procedure was assessed. Residents were categorized into groups defined by their PGY status, as junior (PGY 1-2), senior (PGY 3-4), or chief (PGY ≥ 5).

Outcomes

Complications were categorized as follows for univariate analysis: cardiovascular (including postoperative cardiac arrest, myocardial infarction, or cerebrovascular accident), urinary tract infections, and wound complications (including superficial, deep, and organ space surgical site infections and wound dehiscence). They were then grouped into the composite outcome of overall complications on multivariate models. Additional outcomes included prolonged length of stay (pLOS; >3 days) and prolonged operative time (pOT; >204 minutes), defined according to the highest quartile (≥ 75 th percentile). Finally, 30-day readmission data were defined dichotomously and reported for procedures beginning January 2011.

Statistical Analyses

A multiple imputation technique was implemented to adjust for missing values in preoperative characteristics (ie, hematocrit and creatinine). Descriptive statistics of categorical variables focused on frequencies and proportions. The chi-square and t tests were used to compare proportions. Subsequently, multivariate logistic regression models tested the association between preoperative covariates and the aforementioned outcomes.

All statistical tests were performed using SPSS 22 (IBM Corporation, Armonk, NY), with a 2-sided significance level set at $P < .05$. An institutional review board waiver was obtained before conducting this study, in accordance with institutional regulation when dealing with deidentified administrative data.

RESULTS

Descriptive Analyses

In 185 of 235 cases (78.7%), residents were involved in the procedure. Median (interquartile range) age was 51

years (43-66 years) for patients operated by an attending alone vs 47 years (36-57 years) with resident involvement ($P = .011$). The majority of patients were overweight (body mass index >25 kg/m²; 81.7%), without significant differences between groups ($P = .96$). For creatinine and hematocrit, no discrepancies were found in preoperative values among both cohorts ($P = .73$ and $.47$, respectively). Patients who were operated on by attending only had a higher percentage of diabetics ($P = .047$; [Table 1](#)).

Outcomes

In univariate analyses, the overall complication rate was 5.5% and did not differ between the two groups ($P = .59$). Both cases of postoperative myocardial infarction occurred in the resident involvement group but were not statistically significantly associated ($P = .46$). Urinary tract infections occurred in 2.7% of procedures with resident involvement but were not statistically significant ($P = .24$). Wound complications occurred in both cohorts, accounted for 2.1% of overall complications and did not differ significantly ($P = .31$).

There was an 11.9% rate of pLOS among surgeries with resident involvement compared with 4% among attending-only surgeries ($P = .1$). A significant difference was noted for pOT: whereas 16% of attending-only surgeries fell into the highest 75th percentile of operative time, almost 32% of cases with resident involvement could be found in the highest quartile ($P = .027$; [Table 2](#)). No patient was readmitted or reoperated during the 30-day postoperative period covered in the NSQIP database.

Multivariate Analyses

Procedures involving residents had a 2.4-fold higher likelihood of pOT (95% confidence interval [CI], 1.3-9.6) than attending-only cases ($P = .035$). However, pLOS (odds ratio [OR], 3.6; 95% CI, 0.6-16.3) and overall complications (OR, 1.5; 95% CI, 0.3-7.1) were not affected ($P = .093$ and $.63$, respectively). In a subgroup analysis adjusted for years of training, urethroplasties with chief resident involvement (training of ≥ 5 years) also had a significantly longer operative time (OR, 3.3; 95% CI, 1.4-8; $P = .008$). Junior and senior resident involvement was not associated with a higher rate of pLOS or pOT compared with attending-only cases. Results did not differ with regard to overall postoperative complication rates in the trainee level subgroup analysis ([Tables 3 and 4](#)).

COMMENT

Current graduate education must balance the needs to deliver high-quality care at affordable costs. This applies particularly to the specialized field of reconstructive urology with its high surgical demands. In theory, this might translate into less resident involvement.⁹ In addition, surgical resident education has become progressively challenging because of expense¹⁰ and work hour limitations.¹¹ To maintain efficiency while achieving the highest standards of

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