Utilization of Preoperative Laboratory Testing for Low-risk, Ambulatory Urologic Procedures

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OBJECTIVE To determine the clinical significance of preoperative laboratory testing for low-risk ambulatory urologic procedures.

MATERIALS AND METHODS The National Surgical Quality Improvement Program (NSQIP) database from 2005 to 2013 was queried for urethral sling procedures, cystoscopic procedures, and scrotal procedures. Multivariate analysis was used to assess for independent predictors of preoperative laboratory testing utilization and for postoperative complications.

RESULTS Overall, 7378 procedures were identified, with 73.9% undergoing 1 or more laboratory tests, including 37.9% who had no comorbidities. Patients who were tested were older, had a higher American Society of Anesthesiologists class, and had more preoperative comorbidities. Of these procedures, only 2.9% resulted in any complication. Most laboratory tests were drawn within 1 week of the procedure. On multivariate analysis of testing utilization, increasing age and medical comorbidities were predictive of testing. Multivariate analysis of postoperative outcomes showed that abnormal test laboratory findings were not predictive of postoperative complications in those with and without NSQIP-defined comorbidities.

CONCLUSION Abnormal preoperative laboratory testing was not a significant independent predictor of postoperative complications. Almost 40% of patients received preoperative testing despite having no NSQIP-detected comorbid conditions. A multidisciplinary approach should be taken to define procedures in which preoperative laboratory testing may be eliminated. UROLOGY 94: 77–84, 2016. © 2016 Elsevier Inc.

An estimated 65%-70% of all surgical procedures are performed in the ambulatory setting annually, with over $10 billion spent on preoperative testing for these procedures.[1,2] Historically, preoperative evaluations included a full history and physical examination in addition to laboratory testing, imaging, and cardiopulmonary testing.[3] However, the clinical impact of this extensive evaluation is questionable.

Current recommendations for preoperative testing are largely based on expert opinion and low-level evidence.[4-6] The overall consensus is to tailor preoperative testing based on medical conditions, medication use, or signs and/or symptoms, which raise the pretest probability of abnormal findings. Despite this, 54%-90% of patients receive at least 1 preoperative test without any indication.[7-10]

Several studies have questioned the need for preoperative testing for patients undergoing low-risk, ambulatory procedures in the general surgery, ophthalmology, gynecologic and neurosurgery fields, and found that even when abnormal, these tests have little predictive value for complications.[7-12] Thus, we sought to evaluate the impact of preoperative laboratory assessment on postoperative complications in patients undergoing low-risk general urologic procedures using a population-level surgical outcomes database.

MATERIALS AND METHODS

Dataset

The American College of Surgeons National Surgical Quality Improvement Program (NSQIP) database is a risk-adjusted, nationally validated program to improve the quality of surgical care.[13] It aggregates data from over 400 participating public, academic, and private centers, and is prospectively maintained by surgical clinical reviewers. These surgical clinical reviewers undergo

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training and continuing education, and are audited to ensure reliability. Over 240 variables are prospectively collected including demographic information, preoperative characteristics, and postoperative outcomes. These data have been shown to be reliable in prior studies.[14,15]

Cohort

We queried the American College of Surgeons NSQIP Participant Use File between 2005 and 2013 to identify our sample. Using Current Procedure Terminology codes (Supplementary Table S1), we identified all patients over 18 years old undergoing transurethral procedures, urethral sling operations, and scrotal procedures (spermatocelectomy, epididymectomy, varicocelectomy, hydrocelectomy). Transurethral procedures included cystourethroscopic procedures (with or without ureteral catheterization) for a variety of urologic indications (eg, removal of ureteral calculus, treatment of ureteral strictures). All patients with a prior operation in the 30 days preceding their procedure or who underwent an emergent procedure were excluded. In an effort to focus on preoperative testing for low-risk ambulatory cases, patients with severe acute or chronic medical processes who require laboratory monitoring were excluded. These included American Society of Anesthesiologists (ASA) class 4 or 5, chemotherapy receipt, radiotherapy receipt, and preoperative conditions such as acute renal failure, dialysis, pneumonia, impaired sensorium, ventilator support, sepsis, systemic inflammatory response syndrome, disseminated cancer, open wound infections, resting leg pain and/or gangrene, preoperative blood transfusion, central nervous system tumor, coma, hemi/para/quadriplegia, and ascites (Supplementary Figure S1).

Outcome

Our primary outcome was 30-day postoperative morbidity as defined as occurrence of 1 or more of the following complications captured by the NSQIP database: pneumonia, deep vein thrombosis, pulmonary embolism, ventilation for greater than 48 hours, unplanned intubation, progressive renal insufficiency, acute renal failure, stroke, cardiac arrest, myocardial infarction, graft/prosthesis/flap failure, coma for greater than 72 hours, peripheral neurologic deficit, postoperative transfusion, sepsis, organ space surgical site infection, wound dehiscence superficial surgical site infection, deep incisional site infection, or urinary tract infection. Secondary outcomes included predictors of laboratory testing usage, 30-day mortality (of any cause), and readmission rate.

Independent Variables

Preoperative laboratory information was available on serum sodium, creatinine, blood urea nitrogen (BUN), albumin, total bilirubin, serum glutamic oxaloacetic transaminase (SGOT), alkaline phosphatase, white blood cell (WBC) count, hematocrit (HCT), platelet count, prothrombin time (PT), partial prothromboplastin time (PTT), and international normalized ratio (INR). Normal ranges were defined as 34%-45% for HCT, 4000-12,000/mm^3 for WBC count, 150,000-400,000/mm^3 for platelet count, 135-145 mmol/L for serum sodium, <23 mg/dL for BUN, <1.04 mg/dL for creatinine, <38 seconds for PTT, <14.7 seconds for PT, <1.5 for INR, >3.5g/dL for albumin, <1.1 mg/dL for total bilirubin, <40 units/L for SGOT, and <122 units/L for alkaline phosphatase as previously described.[7] These tests were collapsed into serum chemistry tests (sodium, creatinine, BUN), liver function tests (albumin, total bilirubin, SGOT, alkaline phosphatase), hematology tests (WBC count, HCT, platelet count), and coagulation profile (PT, PTT, INR).

Patient descriptors included age, sex, and race (non-Hispanic white, black, other). Clinical characteristics included body mass index, smoking status, dependent functional status, steroid use, ASA physical status, hypertension requiring medication, type 2 diabetes, and bleeding disorders. Pulmonary conditions were collapsed and included chronic obstructive pulmonary disease and dyspnea (at rest or with moderate exertion). Cardiac diseases were collapsed and included history of myocardial infarction, congestive heart failure, angina, previous cardiac surgery, previous percutaneous coronary intervention, hypertension, and peripheral vascular disease. Neurologic risk factors included previous transient ischemic attack and cerebrovascular accident.

Statistical Analysis

Patients who received a preoperative laboratory testing were compared against those who did not. Univariate analyses were used to test for differences among patient demographics, medical comorbidities, and postoperative complications. Chi-square test was used for categorical variables and the Student *t* test was used for normally distributed continuous variables. A P value of <.05 was considered significant. Multiple logistic regression analysis was used to identify predictors of laboratory testing utilization, and a separate model was used to identify predictors of postoperative complications. All patient demographic information, medical comorbidities, preoperative laboratory information, and procedure type were included as independent predictors. All analyses were performed using SPSS 23.0. Our retrospective study was deemed exempt by our institutional review board.

RESULTS

Overall, 2732 scrotal surgeries, 3452 sling procedures and 1194 cystoscopies were included in our analysis.

Table 1 shows the utilization of preoperative laboratory testing across procedure categories. The utilization of preoperative testing ranged from 67.7% in scrotal surgery

Table 1. Utilization of preoperative testing among urologic ambulatory surgeries

	Received Preoperative Testing % (n)	Abnormal Finding % (n)
Scrotal surgery (n = 2732)		
Any	67.7 (1849)	44.1 (1206)
Chemistry	62.4 (1705)	42.4 (724)
Hematology	61.3 (1676)	42.0 (714)
Coagulation	22.3 (609)	6.1 (37)
Liver function	21.2 (580)	16.7 (94)
Sling procedures (n = 3452)		
Any	74.8 (2582)	27.0 (933)
Chemistry	67.7 (2338)	21.9 (514)
Hematology	68.7 (2373)	20.2 (485)
Coagulation	28.2 (973)	3.2 (31)
Liver function	22.6 (779)	12.4 (95)
Transurethral procedures (n = 1194)		
Any	85.8 (1025)	60.3 (720)
Chemistry	83.9 (1002)	51.3 (517)
Hematology	82.2 (982)	36.7 (366)
Coagulation	29.4 (351)	9.4 (33)
Liver function	40.3 (481)	23.7 (113)