Effect of preoperative single-dose tamsulosin on postoperative urinary retention after mid-urethral sling placement: a randomized, double-blinded, placebo-controlled trial

Principal Investigator
Angela Leffelman, MD

Clinical Research Supervisor
Ghazaleh Rostami, MD

Sub-Investigator(s)
Roger Goldberg, MD MPH
Sonia Dutta, MD
Adam Gafni-Kane, MD
Ghazaleh Rostami, MD
Joel Winer, MD MHS
Henry Chill, MD

Sponsor
None

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Purpose

The purpose of this study is to evaluate whether a single dose of preoperative tamsulosin may improve postoperative urinary retention rates determined by postoperative retro-fill voiding trial compared with placebo.

Background

Postoperative urinary retention has been defined as the inability to void despite having fluid in the bladder during the postoperative period (3). Urinary retention after pelvic reconstructive surgery requiring indwelling catheter or self-catheterization usage occurs in approximately 30-60% of patients postoperatively (1,2,3).

During a retro-fill voiding trial, the bladder is back-filled with a set amount of sterile water (often 300mL), the catheter is removed, the patient is permitted to void and the voided volume is compared with a bladder scan post void residual volume. "Passing" a voiding trial has previously been defined as voiding equal or greater than ⅔ the residual volume, whereas others characterize "passing" as voiding at least 200mL and voiding a greater volume than the post-void residual volume (4). If the patient does not "pass" the voiding trial, the patient is characterized as having postoperative urinary retention and is discharged home with an indwelling catheter to prevent detrusor injury from bladder overdistention, pain and urinary tract infection (5).

Many women consider being discharged home with a Foley catheter to be a surgical complication and describe catheter use as the worst aspect of their surgery (1,6). Indwelling catheters are the leading cause of hospital-acquired urinary tract infections (UTIs), are often a source of embarrassment and inconvenience for patients, and often require additional office visits and healthcare utilization (8).

Tamsulosin is an alpha-adrenergic receptor blocker which is thought to increase smooth muscle relaxation and improve urinary flow (9). Current literature has been primarily focused on the effect of tamsulosin in men with benign prostatic hyperplasia, however may be beneficial in women as well with limited studies for postoperative urinary retention (9). Chapman, et al published a randomized control trial evaluating postoperative urinary retention after female pelvic reconstructive surgery (10). These patients underwent 10 days of tamsulosin (3 days preoperative and 7 days postoperative) and were found to have a 65% decrease in the urinary retention rate from 25.8% to 8.8% (10). Livne, et al published a study evaluating postoperative urinary retention decrease of 79.2% after postoperative administration of dibenzyline (an alpha-adrenergic receptor blocker) in women undergoing hysterectomy (post-operative urinary retention rate of 18.75% in controls and 3.9% in the treatment group) (11). Additional studies have also been published evaluating postoperative urinary retention in men and women undergoing various surgeries and have demonstrated a decrease in postoperative urinary retention after tamsulosin administration from 72-88% compared with controls (12-14). These studies vary in tamsulosin administration from multiple days preoperative and postoperative to multiple doses preoperative and postoperative to a single postoperative dose, however no studies have been published in evaluating a single preoperative dose of tamsulosin and the effect on postoperative urinary retention (10-14). This has previously been studied as tamsulosin reaches a steady state in approximately 5 days, however when tamsulosin is given in a fasting patient, it can reach the maximum blood concentration in approximately 4-5 hours (10,15). As the majority of female pelvic reconstructive surgeries performed by our department are same-day surgeries, with patients being discharged the day

of surgery, we would like to investigate the effect of a single preoperative dose of tamsulosin on postoperative urinary retention and, by effect, home catheter usage after surgery. Tamsulosin is cost-effective at approximately $2 per tablet (16). Despite primarily being prescribed for benign prostatic hyperplasia, tamsulosin has been found to be a safe and well-tolerated treatment for voiding dysfunction in women (9).

Postoperative urinary retention is common after pelvic reconstructive surgery with mid-urethral sling placement and is extremely bothersome to patients. Tamsulosin is a low-risk, well tolerated, cost-effective medication that studies have suggested may decrease the rate of postoperative urinary retention (9). No study to date has evaluated preoperative administration of single- dose tamsulosin for postoperative urinary retention in a randomized placebo-controlled trial.

Hypothesis

We hypothesize that providing preoperative tamsulosin will improve postoperative urinary retention rates determined by postoperative retro-fill voiding trial compared with placebo.

Objectives

The **primary objective** of this study is to evaluate whether preoperative administration of tamsulosin will decrease the rate of postoperative urinary retention after mid-urethral sling placement with or without concomitant prolapse surgery compared with placebo. The **secondary objective** of this study is to evaluate for any differences in hypotension, unplanned admission, postoperative UTI, or unplanned 30-day healthcare encounters after preoperative tamsulosin compared to placebo.

Specific Aims

1. Compare the postoperative urinary retention rates after preoperative administration of tamsulosin compared with placebo.
2. Compare differences in postoperative pain (postoperative nursing documentation performed in the recovery area based on a Likert scale of 0-10), hypotension (immediately postoperative) or postoperative UTI (UTI within 30 days of procedure) after preoperative administration of tamsulosin compared with placebo.
3. Compare time to Foley catheter removal and voiding trial in the recovery area between the two study groups.
4. Evaluate the difference in unplanned admission the day or surgery or unplanned admission within 30 days after surgery, unplanned office visits within 30 days after surgery or Northshore encounters within 30 days after surgery after preoperative administration tamsulosin compared with placebo. These medical encounters will include any need for additional medical treatment, phone calls, complications or patient concerns within 30 days postoperatively. This data will be collected via chart review.
5. Evaluate subjective measure of “feeling empty” after a void compared with PVR value.

Outcome measures

1. Primary outcome measure:

a. Determine the postoperative urinary retention rates after preoperative administration of tamsulosin compared with placebo. This will be determined immediately postoperative in the postoperative recovery room based on whether patients pass or fail their voiding trial described above. The result will be documented in electronic medical records and obtained from chart review.

2. Secondary outcome measures:

a. Determine differences in postoperative pain, hypotension, postoperative UTI after preoperative administration of tamsulosin compared with placebo. This data will be obtained by electronic data pull and chart review.
b. Determine time to Foley catheter removal and voiding trial in the recovery area between the two study groups which will be obtained by chart review of the documentation for Foley removal.
c. Determine the difference in unplanned admissions, office visits or Northshore encounters within 30 days after surgery after preoperative administration of tamsulosin compared with placebo. This data will be collected via chart review.
d. Determine correlation between subjective measure of "feeling empty" and PVR. This will be documented in the electronic medical record by the postoperative nursing staff along with the PVR result obtained from ultrasound in the postoperative recovery area.

Methods

This is a prospective randomized, double-blinded, placebo- controlled trial of patients who are undergoing elective mid-urethral sling placement with or without concomitant prolapse surgery with the Center for Pelvic Health at the Northshore University Health System.

Women presenting to our tertiary urogynecology clinic with stress urinary incontinence who decide to proceed with surgical treatment of stress urinary incontinence via a mid-urethral sling placement will be invited to participate in this study. This study will be discussed with the patient by their surgeon during their clinic initial screening visit or preoperative visit based on inclusion and exclusion criteria listed below. This study will involve no additional pre-operative tests or questionnaires, beyond our routine clinical pathway for women presenting with stress urinary incontinence. Written consent will be obtained.

During the initial clinic visit, patients will be provided information on the research study by their care provider and given the opportunity to ask any questions. Patients will then be given a consent form to take home and review, discuss with others and consider participation. At the second clinic preoperative visit, patients will have another opportunity to discuss the study and ask any questions to their care provider. At that point, patients will be given the opportunity to sign the consent form if they would like to participate in the study. Participation is voluntary. For patients who will not have a second preoperative clinic visit prior to surgery, during the initial clinic visit, the care provider will discuss the research study, provide a consent form to the patient to review and ask for permission from the patient to be contacted by a study team member. If permission is granted, a study team member will contact the patient via telephone to discuss the study further and allow for the patient to consider participation in the study and ask any questions. If at that time the patient decides to participate in the study, written consent will be obtained the morning of surgery. All consent documentation and research participation will be documented in the patient's chart.

Patients who are undergoing a mid-urethral sling placement will be enrolled (after the previously described informed consent discussion) to receive either a single tablet of tamsulosin 0.4mg or a placebo in the preoperative holding area on the day of their scheduled surgery.

Randomization will occur by simple randomization (1:1 randomization) with a computer-generated random number list. The patient will be randomized to one of the two groups (preoperative tamsulosin 0.4mg tablet versus placebo). This random number list will be sent directly from the statistician to the pharmacy. The clinician will place an order for the preoperative trial medication and the pharmacy will

dispense either a single tablet of tamsulosin 0.4mg or placebo to the preoperative holding area according to the randomization list that the pharmacy has been provided by the statistician. The trial medication will be sent from the pharmacy to the preoperative area to be taken prior to surgery. The clinicians, preoperative and postoperative nursing staff, and the patients will be blinded to the trial group and medication.

After surgery, patients will then undergo a retro-fill voiding trial in the recovery area. The voiding trial will be performed as follows: using a Foley catheter placed in the OR, we will retro-fill the bladder with 300mL of sterile normal saline (using the catheter that is already in place, a trained nurse will fill the bladder with sterile normal saline), the catheter will be removed and the patient will be asked to void. The measured voided volume will be recorded and a bladder scan post-void residual (PVR) volume will be obtained. Patients will be asked if they "feel empty" as a subjective measure of voiding success. As described in prior studies, the patient will fail the voiding trial if voided volume is less than ⅓ total bladder volume and PVR is greater than or equal to 200mL. Upon failing the voiding trial, the patient will be discharged home with a Foley catheter with plan for outpatient follow up for catheter removal in clinic, consistent with our current protocol. According to our current protocol, patients discharged with a Foley catheter can either remove the catheter at home in 48-72 hours after surgery or call our office to have it removed at the next available appointment within 2-5 days postoperatively.

We will then evaluate the rate of postoperative urinary retention after preoperative administration of tamsulosin compared with placebo. Any collected information will be de-identified.

The current rate of postoperative urinary retention at our institution based on chart review is 25%. Published data discussed above have described a postoperative urinary retention rate decrease of 65-88% (10-14). Based on a sample size calculation to achieve 80% power, to evaluate for a 65% decrease in our urinary retention rate (from 25% to approximately 8.8%) we will need to recruit 160 total subjects (80 per group).

Inclusion criteria
Mid-urethral sling placement (CPT 57228)

Exclusion criteria
Age <18
Planned combined cases with colorectal surgery, general surgery, or gynecology-oncology
Planned sling revision or history of prior sling placement
Known history of urinary retention
Concomitant intravesical botulinum injections
Known contraindication to tamsulosin

Variables
MRN
Age (at time of surgery)
Gravity and para
Race/ethnicity
Smoking status
Menopausal status
BMI

- Comorbid conditions
    - Diabetes
    - Hypertension
    - Other cardiovascular disease
    - Respiratory disease
    - Obstructive sleep apnea
    - Chronic pain conditions
- Prior hysterectomy
- Prior abdominal surgery
- History of prior prolapse surgery
- Prolapse stage
- Location of surgery (Highland Park Hospital, Evanston)
- Type of anesthesia
- ASA grade
- Incontinence procedure
- Mid-urethral sling placement: CPT 57228
- Concomitant prolapse procedures
    - Anterior colporrhaphy: CPT 57240
    - Posterior colporrhaphy: CPT 57250
    - Combined anterior and posterior colporrhaphy: CPT 57265
    - Apical prolapse suspension
        - Vaginal vault suspension
        - Intraperitoneal: CPT 57283
        - Extraperitoneal: CPT 57282
        - Sacrocolpopexy: Minimally invasive (robotic-assisted and laparoscopic): CPT 57425
- Concomitant procedures
    - Hysterectomy
    - Rectopexy
- Intraoperative complications
- Additional procedures (lysis of adhesions)
- Intraoperative consultations
- Length of procedure
- Estimated blood loss
- Surgeon
- Surgeon experience (< 5 years, > 5 years)
- Total time in PACU
- Time of day in ASU
- Total time in ASU
- Immediate postoperative complications
    - Uncontrolled nausea
- Uncontrolled pain
- Hypotension
    - Incisional bleeding
- Postoperative pain scores upon admission to the ASU
- Postoperative pain scores at discharge
- Reason for postoperative admission (surgeon choice, comorbid conditions, nausea/vomiting, etc.)
- Time from voiding trial to void
- Subjective determination of “feeling empty”

Postoperative urinary retention
Postoperative urinary tract infection (UTI)
Unanticipated healthcare encounters
    Urogynecology office visit (excluding voiding trial(s))
    ED visit
    Readmission within 30 days of discharge
    Unplanned phone calls
Complications 30 days after discharge
    Urinary tract infection
    Reoperation
    Venous thrombotic event

Statistical Methodology

A statistician from the NorthShore Research Institute will assist with statistical analysis. Data will be analyzed using SAS 9.4 (SAS Inc., Cary, NC). Demographic and clinical characteristics between groups will be compared using Student t-test (parametric) or Mann-Whitney U test (nonparametric) for continuous variables and Chi-squared test or Fisher exact test for categorical variables. Multivariable logistic regression models will be constructed to examine the relationship of an outcome with demographic and clinical covariates. Statistical significance will be defined at p-value < 0.05.

Literature review

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