Unplanned Hospital Visits in the First 30 Days After Urethral Sling Procedures

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OBJECTIVE To evaluate unplanned hospital visits within 30 days of urethral sling placement in the form of emergency department visits, inpatient admissions, or repeat surgery.

METHODS We accessed nonpublic data from the Office of Statewide Health Planning and Development in the state of California for the years 2005-2011. All female patients who underwent an ambulatory urethral sling procedure (Current Procedural Terminology 57288) without concomitant surgery (other than cystoscopy) were included. Any subsequent emergency department visit, inpatient admission, or sling revision operation within 30 days of the original surgery were then examined.

RESULTS A total of 28,635 women were identified who underwent outpatient urethral sling placement as a sole procedure. Within 30 days, 1630 women (5.7%) had at least 1 unplanned hospital visit. This included 1327 emergency department visits (4.7%), 295 inpatient admissions (1.0%), and 79 sling revisions (0.28%). Urinary retention and Foley catheter problems were the most common emergency department visit diagnoses (18.7% of visits), followed by urinary tract infection (9.3% of visits).

CONCLUSION One in 18 women will have an unplanned hospital visit within 30 days of urethral sling placement, the majority of which are emergency department visits (~81%). Our findings can be used to improve patient counseling and suggest areas that one might target to decrease unnecessary emergency department visits in the early postoperative period. UROLOGY 103: 79–83, 2017.

Stress urinary incontinence (SUI) is common in women, with an estimated 200,000 procedures performed annually to address this condition.[1] The majority of durable SUI procedures performed in the United States are urethral slings. When performed as standalone procedures, urethral sling repairs are commonly done in the outpatient surgery setting in less than 30 minutes.[2]

Unfortunately, urethral slings procedures are not without complications. Urethral obstruction leading to urinary retention, vaginal mesh exposure, stress incontinence persistence, or pain may occur. These types of complications may eventually necessitate sling revision. The long-term all-cause sling revision rate of 3%-4% has been well documented in large population-based datasets.[3,4] However to date, the short term 30-day complication rate of sling procedures have been incompletely evaluated.

Recently, a study of urethral sling complications using the National Safety Quality and Improvement Project (NSQIP) was presented, in which a 3.5% 30-day complication rate was noted.[5] Although the NSQIP accurately captures inpatient admissions and repeat surgeries, it has limitations. Among these are that outpatient complications and emergency department visits are limited to patient reporting via a follow-up survey phone call. Further, reporting of inpatient admissions or surgeries occurring at a separate facility can be incompletely recorded as they are only captured during the phone survey portion of follow-up. Given these limitations, we sought to more comprehensively evaluate the short term (30-day morbidity) of female urethral sling procedures in the form of unplanned hospital visits (emergency department visits, inpatient admissions, and repeat surgeries).

METHODS

With approval from the California Protection of Human Subjects Committee, we accessed nonpublic data from the Office of Statewide Health Planning and Development

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(OSHPD) in the state of California for the years 2005-2011. The OSHPD datasets compile information on all nonfederal inpatient hospitalizations (Patient Discharge Dataset), ambulatory surgeries (Ambulatory Surgery Dataset), and emergency department visits (Emergency Department Dataset) in the state of California. Each individual in the state has a unique record linkage number that allows subjects to be followed longitudinally in and between each dataset. In each dataset, up to 25 diagnosis codes and 20 procedure codes are available per encounter.

We identified all female patients who underwent an ambulatory urethral sling procedure (Current Procedural Terminology [CPT] 57288). To remove contamination from complications created by other concomitant procedures, we excluded any woman who received any other concurrent surgical procedure, with the exception of cystoscopy (CPT 52000). We also excluded patients who had their procedure within 30 days of the dataset end date (December 1, 2011). After creating our cohort, the Ambulatory, Discharge and Emergency Department datasets were merged together based on a patient's unique record linkage number. Patients were then evaluated for any unplanned hospital visits occurring within 30 days of index urethral sling placement. These encounters were defined as adverse events or complications. These events or complications were categorized as: (1) ambulatory surgery (revision surgery); (2) inpatient admission; or (3) emergency department visit.

Patients were deemed to have an ambulatory surgery complication if within 30 days of sling placement they underwent a urethral sling revision (CPT 52827) or urethrolysis (CPT 53500). If a patient was admitted as an inpatient from the emergency department, this was considered an inpatient complication, and not an unplanned emergency department visit. For simplicity, patients were considered to have either no complication or 1 or more complication visits per venue (ie, if a subject had 3 emergency department visits, she was counted as having 1 emergency room visit complication; however, if a patient was seen in the emergency department and then subsequently had a sling revision, she was counted for both). As emergency department complications were the most prevalent of the unplanned visits, a specific subset analysis of the reason for emergency department visit was performed based on the primary diagnosis associated with the encounter. We individually reviewed each of the 250 individual unique International Classification of Diseases 9th Revision (ICD-9) diagnoses that were coded and combined similar codes.

The chi-square test was used to explore for associations between categorical variables, and continuous variables were assessed with 2-sided *t* tests. A *P* value less than .05 was taken to indicate significance. All dataset coding and analysis was performed using STATA version 14 (College Station, TX).

RESULTS

Between 2005 and 2011, 48,415 outpatient urethral slings were placed in California. Of these cases, 19,326 were excluded because of a concomitant surgery being performed other than cystoscopy. The most common concurrent case types were vaginal prolapse surgery or gynecologic procedures on the uterus or ovaries. After exclusions, a cohort of 28,635 women who underwent 29,089 sling procedures remained. The mean age of the final study cohort was 54.7 years, with a preponderance of patients being identified as either White or Hispanic. The most common payer type was commercial-based insurance (Table 1). The majority of patients underwent a single sling procedure during the time period studied; however, a small percentage of patients underwent a second (419; 1.46%), third (32; 0.11%), and fourth sling procedure (3; 0.01%) (Table 2).

Table 1. Demographic data for women undergoing sling placement

Mean Age (SD)		54.7 (12.6) Years
Race	White	18230 (63.7%)
	Hispanic	6577 (23.0%)
	Black	474 (1.7%)
	Asian/Pacific Islander	1518 (5.3%)
	Other/unknown	1836 (6.3%)
Payer	Commercial	19609 (68.4%)
	Medicare	6842 (23.9%)
	Medi-Cal/Medicaid	1300 (4.5%)
	Self-pay	478 (1.7%)
	Other	406 (1.4%)

SD, standard deviation.

Of the 28,635 primary sling placements, 1630 patients had at least 1 unplanned hospital visit (5.7%) within 30 days. Of the unplanned visits within 30 days, 1327 were in the form of an emergency department visit (81.4%), 295 were inpatient admissions (18.0%), and 79 were sling revisions (4.8% of unplanned visits and 0.28% of all sling placements) (Table 2). Within 30 days of sling placement, there were a total of 6 mortalities (0.02%), 1 of which was directly related to her surgery as she was readmitted to the hospital on postoperative day 1 and then died of septic shock the following day after suffering a bowel injury from her sling placement (Table 3).

Of the 1327 emergency department visits, after grouping similar diagnoses, we found that 10 groups represented 64.8% of all presentations. The most common diagnoses coded (~19% of emergency department visits) were for urinary retention (248 patients). The second most common diagnosis was urinary tract infection (9.3% of emergency department visits). Of the top 10 diagnoses, 3 diagnoses were likely unrelated to a patient's sling procedure. These included primary diagnoses of arthritis or joint pain, unrelated injuries, and headache (third, fourth, and ninth most common reasons for emergency department visits, respectively) (Table 4).

As a corollary to our initial analysis, we compared the complication rates of women who underwent a single vs multiple sling placements during the study period (Table 2). We were able to identify 419 patients who had a second sling after their index sling, 32 who had a third sling, and

Table 2. 30-Day unplanned hospital visits stratified by prior number of urethral sling placements

Sling Placement	Event Within 30 Days # (% of Total Cohort)	Emergency Department Visit # (% of Total Cohort)	Inpatient Admission # (% of Total Cohort)	Sling Revision # (% Total Cohort)
First sling, n = 28,635	1630 (5.7%)	1327 (4.6%)	295 (1.0%)	79 (0.28%)
Second sling, n = 419	26 (6.2%)	19 (4.5%)	8 (1.9%)	1 (0.24%)
Third sling, n = 32	4 (12.5%)	3 (9.2%)	0 (0.0%)	1 (3.1%)
Fourth sling, n = 3	1 (33.3%)	0 (0.0%)	0 (0.0%)	1 (33.1%)

Table 3. Cause and time of death within 30 days of initial sling procedure

Patient Age	Cause of Death	Days Postoperatively Presenting	Additional Details
59	Hemorrhagic stroke	8	
80	Hemorrhagic stroke	4	
74	Aneurysm with bleeding	5	
76	Septic shock—unrelated to sling placement	26	46-d long hospital stay before expiring
73	Bowel injury from sling	1	Died of septic shock POD#2
82	Cardiac arrest	3	Died in the emergency department

Table 4. Top 10 primary diagnoses associated with an emergency department visit within 30 days of urethral sling placement

Emergency Department Principal Diagnosis	Total 1327
Urinary retention or Foley catheter placement	248 (18.7%)
Urinary tract infection or cystitis	123 (9.3%)
Joint pain or back pain or arthritis	103 (7.8%)
Injury: unrelated to sling procedure (fracture, abrasion, sprain. etc.)	86 (6.5%)
Abdominal pain	79 (6.0%)
Urinary complication of surgery (not otherwise specified)	58 (4.4%)
Operative site wound problems	57 (4.3%)
Syncope or dizziness	35 (2.6%)
Headache	35 (2.6%)
Postoperative bleeding	34 (2.6%)

3 patients who had a fourth sling placed. When compared with the 5.7% unplanned hospital visit rate for an index sling, the 30-day event rate was 6.2% after a second sling, 12.5% after a third sling, and 33.3% after a fourth. Although there was no significant difference in the unplanned visit rate between patients undergoing their first or second sling placement ($P = .20$), the unplanned visit rate was significantly higher in patients undergoing a third or fourth sling placement (14.3%) when compared with those undergoing their first or second sling placement (5.7%) ($P = .02$).

DISCUSSION

In this large population-based study of 28,635 women undergoing a urethral sling procedure without other concomitant procedures, we found that the overall 30-day unplanned hospital visit rate was low, at 5.7%. Most unplanned visits (81.4%) were in the form of emergency department visits, although 18% had an inpatient admission and another 4.8% underwent sling revision. The most common reason for seeking care based on emergency department visits was for urinary retention or Foley catheter problem (18.7% of all emergency departments visits) or UTI (9.3% of all emergency department visits).

Brubaker et al examined both the short- and long-term 2-year adverse event rate of midurethral slings (transobturator and retropubic) in a prospective fashion as part of the trial of midurethral slings (TOMUS) trial.[6] In their 2-year follow-up, they found a total adverse event rate of 42%, with 77% of these occurring in the first 6 weeks. These adverse events included bladder perforation, urethral perforation, mesh erosion or exposure, surgical site infection, urinary tract infection, neurologic symptoms, and other common perioperative adverse events. However, complications such as unplanned hospital visits (emergency department, repeat inpatient admission, and return trip to the operating room for sling revision) were not included. When compared with our analysis, the significantly higher rate of adverse events reported in the TOMUS trial is likely related to the type of adverse event reported. Although the TOMUS trial reported intraoperative and subjective postoperative complaints, our study has the advantage of only capturing complications that are deemed serious enough to require a hospital visit or re-operation. Further, 25% of women in the TOMUS trial had a concomitant vaginal surgery, a confounding factor found commonly in the literature[1,3,4,6]

To our knowledge, only 1 other study has attempted to primarily examine the short-term 30-day complication rate for isolated midurethral sling procedures.[5] This study used the NSQIP database to identify 8772 patients undergoing

a solitary outpatient sling placement. Similar to our findings, they report an inpatient readmission rate of 0.9% (vs 1.0% in our study) and a sling revision rate of 0.17% (vs 0.28% in our study). Overall, they identified a 30-day event rate of 3.5%. However, the majority of events cited (86%) were identified as urinary infections, and it was not clear if these required inpatient or emergency department care. An important advantage of our data over NSQIP is that NSQIP emergency department visits and outpatient complications (including revision surgeries) are limited to patient reporting via a follow-up survey phone call. Many emergency department visits might not have been identified in NSQIP unless they were associated with predefined complication variables such as urinary tract infection or surgical site infection. The OSHPD database not only completely captures all emergency department visits in the entire state but also provides diagnoses coded for by a physician during the emergency department visit, which is likely less subjective than a phone survey. Further, unplanned hospital visits also have the possibility to be lost in NSQIP if a patient goes to another hospital for postoperative care and does not report this on the follow-up phone call. This may be especially relevant, as it has been shown that up to 30% of patients do not notify their original physician of surgical failure after incontinence or prolapse surgery.[7] Finally, compared with our population-based analysis, NSQIP uses a sample of medical centers and thus has potentially more bias.[8-10]

Our study is limited, like most administrative datasets, in that information about a patient's individual comorbidities is incomplete at best. Thus, we cannot draw conclusions about whether certain patient groups were at higher risk for unplanned hospital visits. We also do not have individual physician data that might allow us to assess complication rates as related to type of surgical training or individual surgical volume. Similarly, there are details of the operations we do not have access to such as type of urethral sling placed (autologous, synthetic, or allograft or xenograft) that might affect the types of complications seen. This limitation is likely tempered by the fact that it is not unreasonable to assume that most slings were synthetic because most autologous fascial slings require at least 1 day of hospitalization and our cohort consisted solely of ambulatory procedures. Our results are also dependent on practitioners coding for diagnoses correctly (ie, a patient with dysuria may have been coded incorrectly as having a urinary tract infection). It is also possible that our unplanned visit rate may be overestimated as some emergency department visits may not be related to the prior sling procedure and are merely coincidental (ie, a sprained wrist). Finally, we are unable to identify adverse events that were not in the form of a hospital admission, surgical intervention, or inpatient admission such as those that were treated in a physician's office.

Despite these limitations, our study has many strengths. To date, the present study is the largest we are aware of and most complete to explore 30-day unplanned hospital visits following a urethral sling. Unlike other studies, the follow-up includes all emergency department visits, inpatient admissions, and operations performed at any hospital as long as the patient stayed in the state of California. Although it is possible we may have lost subjects to follow-up if they left the state for subsequent care, we feel this number is likely low secondary to the short 30-day study period. Finally, we evaluated a large sample population, encompassing every nonfederal outpatient surgery performed in California and were not specifically limited to academic medical centers. As California itself includes over 14% of the nation's population and is diverse in its makeup, we feel that our study findings should be applicable to the population at large.

In an era of increased scrutiny of surgical procedures and their complications, it is crucial to understand the detail and frequency of adverse events in the long and short term. This not only aids in quality control, but also allows us as practitioners to better counsel patients and manage their expectations. When applying our findings, a key area that can be identified for improvement is unplanned visits to an emergency department within 30 days of urethral sling placement. As the most common reason for emergency department visit is urinary retention or Foley catheter problem, optimizing a strategy to identify women who are likely to require a catheter would be ideal to prevent such visits. Perhaps standardizing recovery room void trial algorithms, to include both objective (voided volume) and subjective measures (patient force of stream) such as that presented by The Cleveland Clinic, is warranted.[11]

CONCLUSION

The unplanned 30-day hospital visit rate following a urethral sling procedure for female SUI is low at 5.7%. The majority of visits is to emergency departments, and over a quarter of these visits is for urinary retention or Foley catheter problems or urinary tract infection. Addressing these areas may reduce the number of unplanned visits after sling surgery.

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