Minimally Invasive Overactive Bladder Therapy After Prolapse Surgery

Abigail Shatkin-Margolis, MD,*
Lufan Wang, MSc,†
Farnoosh Nik-Ahd, MD,†
Leo D. Dreyfuss, MD,‡
Kenneth Covinsky, MD,§
W. John Boscardin, PhD, and
Anne M. Suskind, MD*†

Author affiliations, Conflicts of Interest, and article information are provided at the end of this article.

Importance Associations between pelvic organ prolapse and overactive bladder exist, yet little is known regarding minimally invasive overactive bladder therapy use among older women following prolapse surgery.

Objective The aim of the study was to determine minimally invasive overactive bladder therapy use (onabotulinumtoxinA injection, percutaneous tibial nerve stimulation, sacral neuromodulation) in older women following prolapse surgery.

Study Design This was a retrospective cohort study of a 100% sample of fee-for-service Medicare beneficiaries who had prolapse surgery 2014–2015. The primary outcome was new minimally invasive overactive bladder therapy and the secondary outcome was new overactive bladder diagnosis within Medicare claims data, within 2 years of prolapse surgery. Data were stratified by surgery type (obliterative, apical, anterior/posterior, and apical with anterior/posterior). Modified Poisson regression models were used to calculate relative risk for each outcome.

Results Among the 58,841 beneficiaries who underwent prolapse surgery, 1,120 (1.9%) received minimally invasive overactive bladder therapy within 2 years. Among those who underwent prolapse surgery and did not have a preexisting diagnosis of overactive bladder, 9.2% (2,580/28,160) had a new overactive bladder diagnosis within 2 years. Factors associated with the increased adjusted relative risk (aRR) of new minimally invasive overactive bladder therapy included surgery type (apical aRR 1.6, 95% CI, 1.2–2.2 compared to obliterative repair), concomitant stress urinary incontinence surgery (aRR 1.3, 95% CI, 1.2–1.5), preexisting overactive bladder (aRR 4.1, 95% CI, 3.4–4.8), and frailty (mild to severe frailty aRR 3.4, 95% CI, 2.7–4.3 compared to not frail).

Conclusion Rates of minimally invasive overactive bladder therapy following prolapse surgery were low in a national cohort of female Medicare beneficiaries despite a high prevalence of disease.

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WHY THIS MATTERS

This study highlights that minimally invasive overactive bladder therapy use is relatively low among female Medicare beneficiaries undergoing pelvic organ prolapse surgery. Despite a high prevalence of overactive bladder in this population, less than 2% received minimally invasive overactive bladder therapy within 2 years of prolapse surgery. While older beneficiaries with greater levels of frailty and comorbidity were more likely to develop overactive bladder following surgery, only those with greater levels of frailty were more likely to receive minimally invasive overactive bladder therapy within 2 years of their prolapse surgery. This suggests that surgeons may be considering age and comorbidity, rather than frailty, when deciding who should receive minimally invasive overactive bladder therapy. Findings from this study show

Pelvic floor disorders (PFDs), including pelvic organ prolapse (POP), are extremely prevalent among older women. Recent studies estimate that more than 30 million American women have at least 1 PFD and that nearly half of women 80 years and older are negatively affected by these conditions.[1] As the demographics in the United States evolve and our older population continues to grow, the number of women with

Supplemental Digital Content

that overactive bladder is common following prolapse surgery and that it is important for surgeons to consider overactive bladder and its treatment in this population of older women. Further work is needed to determine if minimally invasive overactive bladder therapy is underutilized among older women who have undergone prolapse surgery.

POP is projected to increase by nearly 50% from 2010 to 2050.[1] While surgical management remains the gold standard definitive treatment for POP, 1 in 10 women overall undergoing POP surgery report new symptoms of overactive bladder (OAB) following surgery.[2,3]

Despite the rapidly increasing prevalence of POP in the United States and the potential relationship between POP and OAB,[4] surprisingly little is known regarding the utilization of OAB therapies following POP surgery, specifically in older women. Initial management of OAB commonly includes behavioral modification or pharmacotherapy. However, a more recent understanding of the associations between pharmacotherapy and cognitive impairment and dementia have led to potentially earlier consideration of minimally invasive therapies such as onabotulinumtoxinA injections (BTX), percutaneous tibial nerve stimulation (PTNS), and sacral neuromodulation (SNM), in the treatment of older women with OAB.[5,6] While these therapies have demonstrated efficacy in improving OAB symptoms,[7–9] research on the use of minimally invasive OAB therapies in older women is limited.

To address this knowledge gap, we designed a retrospective cohort study of a 100% sample of fee-for-service female Medicare beneficiaries undergoing POP surgery in 2014 and 2015. This study aimed to explore the utilization of minimally invasive OAB therapy among older women undergoing POP surgery. This population was selected because it represented a cohort of women who were likely to have high prevalence of OAB and established urogynecologic or specialty level care. Furthermore, prior work has shown associations between POP surgery and OAB.[4,10,11] Minimally invasive OAB therapy use was hypothesized to be low despite relatively high rates of OAB in this population. Findings from this study will inform management of OAB among older women.

STUDY DESIGN

Cohort and Database

This was a retrospective cohort study of a 100% sample of fee-for-service female Medicare beneficiaries who underwent POP surgery between January 1, 2014, and December 31, 2015. Data were obtained from the Medicare MedPAR, Outpatient, Carrier, and Master Beneficiary Summary files. This cohort did not include Medicare Advantage Plan beneficiaries. This study was deemed exempt by our institution's institutional review board. Female Medicare beneficiaries 66 years and older who underwent POP surgery during the study period were identified using *Current Procedural Terminology 4 (CPT-4)* codes from the Medicare carrier files and were categorized as follows: obliterative, apical, anterior/posterior, and apical with anterior/posterior repairs (Supplemental Table 1, http://links.lww.com/FPMRS/A600). Included beneficiaries had continuous Medicare enrollment 1 year prior to the date of their POP surgery to allow for measurement of comorbidity and frailty. Included beneficiaries had to have continuous enrollment for the entire 2-year follow-up period, a length of time deemed adequate to capture minimally invasive OAB therapy use. Beneficiaries who had minimally invasive OAB therapy, as defined by *CPT* codes (BTX 52287, PTNS 64566, SNM 64561, 64590, or 64581), during the 1 year prior to POP surgery were excluded as those already receiving minimally invasive OAB therapy prior to surgery represented a different population already undergoing more advanced therapy for OAB. The database includes both office-based and operating room procedures. Beneficiaries with neurogenic bladder-related lower urinary tract symptoms, as identified by the *International Classification of Diseases, Ninth Revision and Tenth Revision (ICD-9 and ICD-10)* (Supplemental Table 2, http://links.lww.com/FPMRS/A600) were also excluded.

Outcome Measures

The primary outcome of this study was the presence of a new minimally invasive OAB therapy within the 2-year period following POP surgery, including any one of the following: BTX, PTNS, and SNM. Beneficiaries who received new minimally invasive OAB therapy within 2 years of POP surgery were identified using *CPT* codes (BTX 52287, PTNS 64566, SNM 64561, 64590. or 64581). The secondary outcome of this study was a new OAB diagnosis within 2 years of POP surgery. A new OAB diagnosis was defined as no OAB diagnoses 1 year prior to the index POP surgery and a new OAB diagnosis within 2 years after the index surgery date. Overactive bladder diagnoses were identified using *ICD-9 and ICD-10* diagnosis codes consistent with existing literature (Supplemental Table 3, http://links.lww.com/FPMRS/A600).[12]

Covariates

Covariates were evaluated for associations with the primary and secondary outcomes. The selected covariates included in the analysis were hypothesized to be related to the development or progression of OAB. Concomitant procedures for hysterectomy and stress urinary incontinence (SUI) performed at the time of the index POP surgery were identified using *CPT* codes (Supplemental Table 4, http://links.lww.com/FPMRS/A600). The Charlson Comorbidity Index (CCI), a validated measure of comorbidity,[13] was calculated using comorbidities derived from the *ICD-9 and ICD-10* codes from Medicare MedPAR, Outpatient, and Carrier files in the year preceding the index surgery. Frailty was evaluated using the Claims-based Frailty Index (CFI), which is a validated measure developed and used in Medicare data.[14] The CFI is calculated using 93 clinical variables (including *ICD-9 and ICD-10* codes, CPT codes, and Healthcare Common Procedure Coding System level II codes). Beneficiaries with more severe frailty, as defined as a higher CFI value, have been shown to have poorer outcomes following various surgical procedures.[15–18] Consistent with previously published work, beneficiaries were divided into 3 categories of frailty: not frail (CFI < 0.15), prefrail (0.15 ≤ CFI <0.25), and mildly to severely frail (CFI ≥ 0.25).[19,20]

Socioeconomic status was evaluated using the Area Deprivation Index (ADI), a well-established measure of socioeconomic disadvantage based on geography.[21] The ADI is calculated based on factors such as income, education, employment and housing quality, and has been shown to correlate with health outcomes.[22,23] The ADI is linked to Medicare data via individual beneficiary nine-digit zip codes. The ADI was presented as 4 quartiles, with the highest quartile (Q4) representing the greatest socioeconomic disadvantage.

Additional covariates included demographic information such as age (grouped 66–74, 75–84, and ≥85 years), race (White, non-White), surgery type (obliterative, apical, anterior/posterior, and apical with anterior/posterior repair), and year of index surgery (2014, 2015).

Statistical Analysis

Demographic data were stratified by type of POP surgery and reported as means with standard deviation and as percentages, where appropriate. The means of each group were compared using an ANOVA test and *P* values are reported. Univariable and multivariable modified Poisson regression models were used to calculate unadjusted and adjusted relative risk ratios for the primary and secondary outcomes: new minimally invasive OAB therapy and new OAB diagnosis.[24] Multivariable models included age, race, POP surgery type, concomitant hysterectomy, concomitant SUI surgery, CCI, CFI, ADI, and surgery year. The model for

Female Medicare beneficiaries ≥ 66 years who underwent POP surgery 2014-2015
N=68,540
↓
Exclude those who had minimally-invasive OAB therapy in the year prior to POP surgery
N=68,052
↓
Exclude those who had a neurogenic related OAB diagnoses
N=64,997
↓
Beneficiaries with ≥ 2 years continuous enrollment
N=58,841 (Table 1, 2)
↓
Beneficiaries without a pre-existing diagnosis of OAB in the year prior to POP surgery
N=28,160 (Table 3)

FIGURE 1. Flow diagram. OAB, overactive bladder; POP, pelvic organ prolapse.

new OAB diagnosis does not include those beneficiaries who had a preexisting diagnosis of OAB (N = 30,681 not included). Data management and statistical analyses were completed using SAS version 9.4, with a *P* value of less than 0.05 indicating statistical significance.

RESULTS

In 2014 and 2015, 58,841 female Medicare beneficiaries underwent POP surgery and met study inclusion criteria (Fig. 1). Table 1 shows baseline characteristics of the study cohort. The average age was 73.8 ± 5.7 years, 92.0% were White, and 52.1% had a preexisting diagnosis of OAB (yet without minimally invasive OAB therapy). A preexisting diagnosis of OAB was most common among those who underwent apical with anterior/posterior repair (60.0%). The majority of beneficiaries underwent isolated anterior/posterior repairs (n = 40,664, 69.1%), followed by apical (n = 9,250, 15.7%), apical with anterior/posterior

TABLE 1. Demographics of Baseline Cohort Characteristics by Surgery Type, Consisting of 100% of Female Medicare Beneficiaries Undergoing Pelvic Organ Prolapse Surgery

		Surgery Type				
Variable Name	Total n (%)	Apical Repair Only, n (%)	Anterior/Posterior Repair, n (%)	Apical With Anterior/Posterior Repair, n (%)	Obliterative Repair, n (%)	*P*
All subjects	58,841 (100.0)	9,250 (15.7)	40,664 (69.1)	5,618 (9.5)	3,309 (5.6)	
Age (years)						
Mean ± SD	73.8 ± 5.7	72.6 ± 5.0	73.7 ± 5.6	73.4 ± 5.3	79.7 ± 6.2	<0.001
65–74	36,897 (62.7)	6,589 (71.2)	25,812 (63.5)	3,703 (65.9)	793 (24.0)	<0.001
75–84	19,298 (32.8)	2,487 (26.9)	13,256 (32.6)	1,735 (30.9)	1,820 (55.0)	
85+	2,646 (4.5)	174 (1.9)	1,596 (3.9)	180 (3.2)	696 (21.0)	
Race						
White	54,137 (92.0)	8,539 (92.3)	37,468 (92.1)	5,179 (92.2)	2,951 (89.2)	<0.001
Black	1,993 (3.4)	316 (3.4)	1,331 (3.3)	195 (3.5)	151 (4.6)	
Other	2,711 (4.6)	395 (4.3)	1,865 (4.6)	244 (4.3)	207 (6.3)	
Charlson Comorbidity score						
Mean ± SD	0.7 ± 1.2	0.7 ± 1.3	0.7 ± 1.2	0.7 ± 1.2	1.0 ± 1.5	<0.001
0	35,820 (60.9)	5,797 (62.7)	24,758 (60.9)	3,586 (63.8)	1,679 (50.7)	<0.001
1–3	20,669 (35.1)	3,080 (33.3)	14,366 (35.3)	1,829 (32.6)	1,394 (42.1)	
≥4	2,352 (4.0)	373 (4.0)	1,540 (3.8)	203 (3.6)	236 (7.1)	
CFI						
Mean ± SD	0.2 ± 0.0	0.1 ± 0.0	0.2 ± 0.0	0.2 ± 0.0	0.2 ± 0.1	<0.001
Not frail (CFI < 0.15)	29,667 (50.4)	5,548 (60.0)	20,067 (49.3)	2,992 (53.3)	1,060 (32.0)	<0.001
Prefrail (0.15 ≤ CFI < 0.25)	26,773 (45.5)	3,469 (37.5)	18,942 (46.6)	2,456 (43.7)	1,906 (57.6)	
Mild to severely frail (CFI ≥ 0.25)	2,401 (4.1)	233 (2.5)	1,655 (4.1)	170 (3.0)	343 (10.4)	
Preexisting OAB diagnosis	30,681 (52.1)	4,808 (52.0)	20,740 (51.0)	3,369 (60.0)	1,764 (53.3)	<0.001
ADI						
Mean ± SD	49.8 ± 22.2	47.7 ± 22.1	50.6 ± 22.2	47.5 ± 22.0	50.0 ± 21.8	<0.001
Q1	15,218 (25.9)	2,653 (28.7)	10,149 (25.0)	1,641 (29.3)	775 (23.4)	<0.001
Q2	14,589 (24.8)	2,388 (25.8)	9,832 (24.2)	1,438 (25.6)	931 (28.2)	
Q3	15,097 (25.7)	2,334 (25.2)	10,499 (25.9)	1,416 (25.3)	848 (25.7)	
Q4	13,850 (23.6)	1,870 (20.2)	10,117 (24.9)	1,112 (19.8)	751 (22.7)	
Surgery year						
2014	31,784 (54.0)	5,035 (54.4)	21,959 (54.0)	2,966 (52.8)	1,824 (55.1)	0.130
2015	27,057 (46.0)	4,215 (45.6)	18,705 (46.0)	2,652 (47.2)	1,485 (44.9)	

ADI, Area Deprivation Index; CFI, Claims-based Frailty Index; OAB, overactive bladder; Q, quartile.

(n = 5,618, 9.5%), and obliterative repairs (n = 3,309, 5.6%). Beneficiaries who underwent obliterative repairs tended to be older (mean age 79.7 ± 6.2 years). A small percentage of the entire cohort was mild to severely frail (4.1%, CFI ≥ 0.25), yet those who underwent an obliterative repair were more likely to be mildly to severely frail (10.4% with CFI ≥ 0.25). Beneficiaries who underwent isolated anterior/posterior repair had the highest level of socioeconomic deprivation (mean ADI 50.6).

Table 2 depicts the multivariable analysis for new minimally invasive OAB therapy within 2 years of POP surgery. Among the 58,841 beneficiaries who underwent POP surgery in 2014 or 2015, 1,120 (1.9%) received a new minimally invasive OAB therapy within 2 years of surgery. The most common minimally invasive OAB therapy in this cohort was SNM (41.2%), followed by PTNS (30.4%) and then BTX (28.4%). Compared to obliterative repairs, isolated anterior/posterior (aRR 1.6, 95% CI, 1.2–2.1), apical (aRR 1.6, 95% CI, 1.2–2.2), and apical with anterior/posterior repairs (aRR 1.5, 95% CI, 1.03–2.05) were associated with an increased aRR of undergoing new minimally invasive OAB therapy. Concomitant SUI surgery (aRR 1.3, 95% CI, 1.2–1.5), preexisting OAB diagnosis (without prior minimally invasive OAB therapy) (aRR 4.1, 95% CI, 3.4–4.8), and CFI ≥ 0.15 (aRR 1.9, 95% CI, 1.6–2.2 for CFI 0.15–0.24; aRR 3.4, 95% CI, 2.7–4.3 for CFI ≥ 0.25; compared to CFI < 0.15) were also associated with an increased aRR of undergoing minimally invasive OAB therapy. Non-White race (aRR 0.7, 95% CI, 0.6–0.9), concomitant hysterectomy (aRR 0.5, 95% CI, 0.4–0.6), and higher levels of socioeconomic deprivation (ADI Q4 aRR 0.7, 95% CI, 0.6–0.9 compared to Q1) were associated with a lower aRR of undergoing minimally invasive OAB therapy. No associations were identified with age, CCI scores and surgery year.

Table 3 represents the multivariable analysis for a new OAB diagnosis within 2 years of POP surgery. This analysis included only those who did not have a preexisting diagnosis of OAB in the year prior to POP surgery. Of this subpopulation, 2,580 (9.2%) beneficiaries had a new diagnosis of OAB within 2 years of the index surgery (Table 3). Older age (aRR 1.1, 95% CI, 1.1–1.2 for 75–84 years; aRR 1.2, 95% CI, 1.03–1.43 for ≥85 years; compared to 65–74 years), greater CCI (aRR 1.3, 95% CI, 1.2–1.4 for CCI 1–3; aRR 1.6, 95% CI, 1.4–1.9 for CCI ≥ 4; compared to CCI = 0), higher CFI score (aRR 1.3, 95% CI, 1.2–1.5 for CFI 0.15–0.24; aRR 1.7, 95% CI 1.4–2.0 for CFI ≥ 0.25; compared to CFI < 0.15), and concomitant SUI surgery (aRR 1.3, 95% CI, 1.2–1.4) were associated with an increased aRR of developing OAB following surgery. Non-White race (aRR 0.8, 95% CI, 0.7–0.9) and concomitant hysterectomy (aRR 0.8, 95% CI, 0.8–0.9) were associated with a lower aRR of developing OAB following surgery. No significant associations were identified with POP surgery type, surgery year, or socioeconomic status. Among the beneficiaries who had a new diagnosis of OAB, 109 (4.2%) received minimally invasive OAB therapy within 2 years of surgery. Similarly to the larger cohort, SNM remained the most common therapy (41.3%), followed by BTX (36.7%) and PTNS (22.0%).

DISCUSSION

In this nationwide cohort of female Medicare beneficiaries who underwent POP surgery, less than 2% received minimally invasive OAB therapy within 2 years following POP surgery. Similar to estimates among women of all ages with POP, more than half of this study's older population had a diagnosis of OAB at baseline, and another almost 10% developed a new diagnosis of OAB in the 2 years following surgery. Surprisingly, higher frailty scores were associated with an increased likelihood of a beneficiary undergoing a new minimally invasive OAB therapy, yet there was no association seen with increasing age or comorbidity.

In a previous investigation of Medicare fee-for-service beneficiaries in the United States, the annual prevalence of OAB among female beneficiaries in 2013 was 6.7%.[25] However, the authors used a more strict definition of OAB, using half as many *ICD-9* codes than in this study. Despite this, this study still shows that OAB is significantly more prevalent in a cohort of women undergoing POP surgery, with more than half of the population having a preexisting OAB diagnosis and nearly 1 out of 10 women developing a new diagnosis of OAB following surgery. These findings are consistent with prior literature and further highlight the need to understand this population better so that surgeons may consider OAB and its treatment in this population.[10] A better understanding of the coexistence of POP and OAB may allow surgeons and patients to discuss treatment plans that address multiple PFDs concurrently.

Despite the high prevalence of OAB in this Medicare population, new minimally invasive OAB therapy utilization was found to be only 1.9% within 2 years following POP surgery. Although it remains unknown whether or not this is appropriate utilization of such

TABLE 2. Relative Risk Associated With New Minimally Invasive Therapy for Overactive Bladder Within 2 Years of Pelvic Organ Prolapse Surgery

	Basic Statistics			Univariable Model			Multivariable Model*		
Variable Name	Observed, n (%)	Event, n (%)	*P*	Relative Risk (95% CI)	*P*	Global *P*	Relative Risk (95% CI)	*P*	Global *P*
All subjects	58,841 (100.0)	1,120 (1.9)							
Age (years)									
65–74	36,897 (62.7)	648 (1.8)	0.002	Ref.		0.002	Ref.		0.055
75–84	19,298 (32.8)	423 (2.2)		1.2 (1.1–1.4)	<0.001		1.0 (0.9–1.2)	0.649	
85+	2,646 (4.5)	49 (1.9)		1.1 (0.8–1.4)	0.718		0.7 (0.6–1.0)	0.051	
Race									
White	54,137 (92.0)	1,054 (1.9)	0.009	Ref.		0.003	Ref.		0.003
Non-White	4,704 (8.0)	66 (1.4)		0.7 (0.6–0.9)	0.009		0.7 (0.6–0.9)	0.009	
POP surgery type									
Obliterative repair	3,309 (5.6)	51 (1.5)		Ref.			Ref.		
Apical repair	9,250 (15.7)	153 (1.7)	0.022	1.1 (0.8–1.5)	0.660	0.014	1.6 (1.2–2.2)	0.005	0.001
Anterior/posterior repair	40,664 (69.1)	821 (2.0)		1.3 (1.0–1.7)	0.059		1.6 (1.2–2.1)	0.001	
Apical with anterior/ posterior repair	5,618 (9.5)	95 (1.7)		1.1 (0.8–1.5)	0.590		1.5 (1.0–2.1)	0.033	
Concomitant hysterectomy									
No	39,431 (67.0)	935 (2.4)	<0.001	Ref.		<0.001	Ref.		<0.001
Yes	19,410 (33.0)	185 (1.0)		0.4 (0.3–0.5)	<0.001		0.5 (0.4–0.6)	<0.001	
Concomitant SUI surgery									
No	37,135 (63.1)	571 (1.5)	<0.001	Ref.		<0.001	Ref.		<0.001
Yes	21,706 (36.9)	549 (2.5)		1.6 (1.5–1.8)	<0.001		1.3 (1.2–1.5)	<0.001	
Preexisting OAB diagnosis									
No	28,160 (47.9)	175 (0.6)	<0.001	Ref.		<0.001	Ref.		<0.001
Yes	30,681 (52.1)	945 (3.1)		5.0 (4.2–5.8)	<0.001		4.1 (3.4–4.8)	<0.001	
Charlson Comorbidity score									
0	35,820 (60.9)	577 (1.6)	<0.001	Ref.		<0.001	Ref.		0.365
1–3	20,669 (35.1)	476 (2.3)		1.4 (1.3–1.6)	<0.001		1.1 (1.0–1.2)	0.157	
≥4	2,352 (4.0)	67 (2.8)		1.8 (1.4–2.3)	<0.001		1.1 (0.8–1.4)	0.579	
CFI									
Not frail (<0.15)	29,667 (50.4)	325 (1.1)	<0.001	Ref.		<0.001	Ref.		<0.001
Prefrail (0.15–0.24)	26,773 (45.5)	676 (2.5)		2.3 (2.0–2.6)	<0.001		1.9 (1.6–2.2)	<0.001	
Mildly to severely frail (≥0.25)	2,401 (4.1)	119 (5.0)		4.5 (3.7–5.6)	<0.001		3.4 (2.7–4.3)	<0.001	
ADI									
Q1	15,218 (25.9)	346 (2.3)	<0.001	Ref.		<0.001	Ref.		<0.001
Q2	14,589 (24.8)	295 (2.0)		0.9 (0.8–1.0)	0.135		0.9 (0.8–1.0)	0.102	
Q3	15,097 (25.7)	239 (1.6)		0.7 (0.6–0.8)	<0.001		0.7 (0.6–0.8)	<0.001	
Q4	13,850 (23.6)	239 (1.7)		0.8 (0.6–0.9)	<0.001		0.7 (0.6–0.9)	<0.001	
Surgery year									
2014	31,784 (54.0)	581 (1.8)	0.146	Ref.		0.148	Ref.		0.286
2015	27,057 (46.0)	539 (2.0)		1.1 (1.0–1.2)	0.147		1.1 (0.9–1.2)	0.285	

*Multivariable model adjusted for age, race, surgery type, concomitant hysterectomy, concomitant SUI surgery, preexisting OAB, CCI, CFI, ADI, and surgery year.

ADI, Area Deprivation Index; CCI, Charlson Comorbidity Index; CFI, Claims-based Frailty Index; OAB, overactive bladder; POP, pelvic organ prolapse; Q, quartile; SUI, stress urinary incontinence.

TABLE 3. **Relative Risk Associated With a New Diagnosis of Overactive Bladder 2 Years Following Pelvic Organ Prolapse Surgery**

	Basic Statistics			Univariable Model			Multivariable Model*		
Variable Name	**Observed, n (%)**	**Event, n (%)**	***P***	**Relative Risk (95% CI)**	***P***	**Global *P***	**Relative Risk (95% CI)**	***P***	**Global *P***
All subjects	28,160 (100.0)	2,580 (9.2)							
Age, n (%):									
65–74	18,224 (64.7)	1,525 (8.4)	<0.001	Ref.		<0.001	Ref.		0.005
75–84	8,766 (31.1)	919 (10.5)		1.3 (1.2–1.4)	<0.001		1.1 (1.1–1.2)	0.002	
85+	1,170 (4.2)	136 (11.6)		1.4 (1.2–1.6)	<0.001		1.2 (1.0–1.4)	0.100	
Race									
White	25,856 (91.8)	2,398 (9.3)	0.028	Ref.		0.020	Ref.		0.004
Non-White	2,304 (8.2)	182 (7.9)		0.9 (0.7–1.0)	0.030		0.8 (0.7–0.9)	0.007	
Surgery type									
Obliterative repair	1,545 (5.5)	172 (11.1)	0.002	Ref.		0.004	Ref.		0.011
Apical repair	4,442 (15.8)	398 (9.0)		0.8 (0.7–1.0)	0.012		1.1 (0.9–1.3)	0.491	
Anterior/posterior repair	19,924 (70.8)	1,771 (8.9)		0.8 (0.7–0.9)	0.003		1.0 (0.9–1.2)	0.855	
Apical with anterior/ posterior repair	2,249 (8.0)	239 (10.6)		1.0 (0.8–1.2)	0.622		1.2 (1.0–1.5)	0.029	
Concomitant hysterectomy									
No	17,660 (62.7)	1,768 (10.0)	<0.001	Ref.		<0.001	Ref.		<0.001
Yes	10,500 (37.3)	812 (7.7)		0.8 (0.7–0.8)	<0.001		0.8 (0.8–0.9)	<0.001	
Concomitant SUI surgery									
No	20,806 (73.9)	1,767 (8.5)	<0.001	Ref.		<0.001	Ref.		<0.001
Yes	7,354 (26.1)	813 (11.1)		1.3 (1.2–1.4)	<0.001		1.3 (1.2–1.4)	<0.001	
Charlson Comorbidity score									
0	17,624 (62.6)	1,377 (7.8)	<0.001	Ref.		<0.001	Ref.		<0.001
1–3	9,476 (33.7)	1,039 (11.0)		1.4 (1.3–1.5)	<0.001		1.3 (1.2–1.4)	<0.001	
≥4	1,060 (3.8)	164 (15.5)		2.0 (1.7–2.3)	<0.001		1.6 (1.4–1.9)	<0.001	
CFI									
Not frail (<0.15)	15,786 (56.1)	1,162 (7.4)	<0.001	Ref.		<0.001	Ref.		<0.001
Prefrail (0.15–0.24)	11,508 (40.9)	1,281 (11.1)		1.5 (1.4–1.6)	<0.001		1.3 (1.2–1.5)	<0.001	
Mildly to severely frail (≥0.25)	866 (3.1)	137 (15.8)		2.1 (1.8–2.5)	<0.001		1.7 (1.4–2.0)	<0.001	
ADI									
Q1	6,613 (23.5)	571 (8.6)	0.109	Ref.		0.109	Ref.		0.174
Q2	6,830 (24.3)	642 (9.4)		1.1 (1.0–1.2)	0.122		1.1 (1.0–1.2)	0.280	
Q3	7,449 (26.5)	723 (9.7)		1.1 (1.0–1.2)	0.028		1.1 (1.0–1.2)	0.161	
Q4	7,215 (25.7)	640 (8.9)		1.0 (0.9–1.1)	0.624		1.0 (0.9–1.1)	0.648	
Surgery year									
2014	15,434 (54.8)	1,438 (9.3)	0.320	Ref.		0.319	Ref.		0.297
2015	12,726 (45.2)	1,142 (9.0)		1.0 (0.9–1.0)	0.320		1.0 (0.9–1.0)	0.298	

Note: Beneficiaries with a preexisting diagnosis of OAB were excluded from this analysis.

*Multivariable model adjusted for age, race, surgery type, concomitant hysterectomy, concomitant SUI surgery, CCI, CFI, ADI, and surgery year.

ADI, Area Deprivation Index; CCI, Charlson Comorbidity Index; CFI, Claims-based Frailty Index; Q, quartile; SUI, stress urinary incontinence.

therapies, these findings are lower than what has been found in other populations. In a cross-sectional investigation of the American Urological Association Quality (AQUA) Registry, a national Qualified Clinical Data Registry that includes data from urology practices across the United States, 2.9% of patients identified with OAB received minimally invasive therapy.[26] However, this comparison is limited due to the fact that

SIMPLY STATED

Pelvic organ prolapse and overactive bladder are two of the most common pelvic floor disorders. Recently, treatment recommendations for overactive bladder have changed, moving away from a stepwise approach and supporting earlier use of minimally invasive therapies–such as bladder onabotulinumtoxinA injections, percutaneous tibial nerve stimulation and sacral neuromodulation–among older women. Despite these changes and the potential associations between overactive bladder and pelvic organ prolapse, surprisingly little is known about minimally invasive overactive bladder therapy use among older women who undergo pelvic organ prolapse surgery. This study aimed to show how common minimally invasive overactive bladder therapy is among female Medicare beneficiaries after pelvic organ prolapse surgery. The authors found that despite nearly half of the population having overactive bladder and another 10% developing overactive bladder after surgery, less than 2% received minimally invasive therapy within 2 years of prolapse surgery. Findings from this study may encourage clinicians to consider overactive bladder and the use of minimally invasive overactive bladder therapy in this population.

the AQUA Registry includes both male and female patients, of all ages, and only those receiving care from urology-based practices. Prior work evaluating a more broad population seeking care at 1 hospital system that included 5,500 patients with OAB showed 3.5% received minimally invasive therapy over a 1-year period.[27] However, when stratified by type of subspeciality care, the authors found higher utilization in patients cared for by urology and urogynecology and reconstructive pelvic surgery departments (10.0% and 14.1%, respectively).[27] This suggests that women receiving care from subspecialists are more likely to receive minimally invasive OAB therapy. One explanation for the lower rate of new minimally invasive OAB therapy use seen in this study may be due to the type of specialty care. We explored specialty-level data; however, we found a large percentage of data missing so did not report on this variable.

Frailty was found to be associated with both new minimally invasive OAB therapy and a new diagnosis of OAB. However, increasing age and comorbidity were only associated with a new diagnosis of OAB and not with new minimally invasive OAB therapy. This suggests that clinicians may be excluding patients from receiving minimally invasive OAB therapy because they are older or carry more comorbidity, yet they may not be measuring or considering frailty as a deciding factor. Alternatively, frailty could be a marker of lack of responsiveness to pharmacotherapy, prompting increased utilization of nonpharmacologic treatments such as BTX, PTNS, and SNM.

Nonetheless, frailty is an important consideration in the management of OAB, as multiple trips to the bathroom and nighttime voiding puts frail older adults at an increased risk of falls and injury.[28] Additionally, frailty has been shown to be a significant predictor of OAB in a population of older adults aged ≥65 years presenting to an academic urology practice.[29] Although it should be a consideration, frailty should not necessarily preclude minimally invasive OAB therapy, as it has been shown that older frail adults demonstrate equivalent symptom improvement and show no difference in adverse events following minimally invasive OAB therapies.[30,31]

Additionally, this study found that concomitant SUI surgery was associated with both outcomes—increased likelihood of receiving new minimally invasive OAB therapy and a new diagnosis of OAB within 2 years of surgery. While it is known that women who have both SUI and OAB and undergo SUI surgery tend to have improvement in both stress- and urge-related incontinence, less is understood regarding the implications of SUI surgery and the prevalence and management of de novo OAB.[32] A recent retrospective cohort study of women undergoing midurethral sling surgery identified the incidence of de novo OAB to be 6.1% within 12 months of SUI surgery.[33] Thus, it is not surprising that concomitant SUI surgery was found to increase the likelihood of both outcomes in our study.

This study should be considered in the setting of certain limitations. Most significantly, inherent to Medicare claims, this study lacks qualitative data and patient-reported outcomes. The benefit of using Medicare claims data, however, is the generalizability and ability to look at a large and nationally representative sample of older adults. Also inherent to claims-based analyses, there is potential for inaccurate use of *ICD* codes. Additionally, this study lacks data on pharmacotherapy and health care provider details. Therefore, it remains uncertain if the low utilization of minimally invasive OAB therapy is due to beneficiaries achieving symptom resolution with noninvasive therapies or medication, or secondary to reduced access to health care providers who offer such therapies. Future work involving OAB medication and health care provider-level data in this population is warranted.

In addition, our study cohort identified primarily as White (92%). The diversity of our sample is limited by the dataset chosen for our cohort, which are real-world data pertaining to fee-for-service Medicare beneficiaries. Our findings should be interpreted in the context of these limitations. This study found that beneficiaries of non-White race and higher levels of socioeconomic deprivation were less likely to receive minimally invasive OAB therapy. However, those who were non-White race were also less likely to have a new diagnosis of OAB following surgery. These results should be interpreted with caution, as racial differences are not biologic, but rather are markers for other factors such as socioeconomic disadvantage and structural racism.[34]

Older women undergoing surgical management of POP have significant disease burden related to a high prevalence of concurrent and subsequent OAB. Despite this, few women receive minimally invasive OAB therapy such as BTX, SNM, or PTNS within 2 years of prolapse surgery. It is important for surgeons to consider OAB and its treatment in this population. More work is needed to determine if minimally invasive OAB therapy is being underutilized in this population.

ARTICLE INFORMATION

From the *Department of Obstetrics and Gynecology, University of California, San Francisco, CA; †Department of Urology, University of California, San Francisco, CA; ‡Department of Urology, Weill Cornell Medical, New York, NY; §Division of Geriatrics, University of California, San Francisco, CA; Department of Epidemiology and Biostatistics, University of California, San Francisco, CA.

Correspondence: Abigail Shatkin-Margolis, MD. E-mail: Abigail.Shatkin-Margolis@ucsf.edu.

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