



# การศึกษาทางคลินิกเกี่ยวกับปัจจัยเสี่ยงของภาวะไอบาม ปัสสาวะเล็ด ที่เกิดขึ้นใหม่หลังผ่าตัดแก้ไขอวัยวะ อุ้งเชิงกรานหย่อนในสตรี

ธีรพันธุ์ สีหนันทวงศ์\*, สิริยา กิติโยดม

กลุ่มงานสูติศาสตร์และนรีเวชวิทยา โรงพยาบาลมหาราชนครราชสีมา จังหวัดนครราชสีมา  
ประเทศไทย 30000

## Risk Factors for Developing De Novo Stress Urinary Incontinence Following Pelvic Organ Prolapse Surgery: A Case-Control Study

Teerapan Seehanantawong\*, Siraya Kitiyodom

Department of Obstetrics and Gynaecology, Maharat Nakhon Ratchasima Hospital,  
Nakhon Ratchasima, Thailand 30000

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### บทคัดย่อ

**วัตถุประสงค์:** เพื่อศึกษาปัจจัยเสี่ยงที่สัมพันธ์กับการเกิด de novo stress urinary incontinence (SUI) ในสตรีที่ไม่มีอาการกลั้นปัสสาวะ  
ไม่อยู่ก่อนผ่าตัด และเข้ารับการผ่าตัดแก้ไข pelvic organ prolapse (POP)

**วิธีการศึกษา:** การศึกษาย้อนหลังแบบ retrospective case-control study ดำเนินการที่โรงพยาบาลมหาราชนครราชสีมา ซึ่งเป็นโรงพยาบาล  
ตติยภูมิ โดยทบทวนเวชระเบียนของสตรีที่เข้ารับการผ่าตัด POP ระหว่างเดือนมิถุนายน พ.ศ. 2557 ถึงมิถุนายน พ.ศ. 2567 รวมผู้ป่วยทั้งหมด  
411 ราย กลุ่มผู้ป่วย (cases; n = 137) หมายถึงสตรีที่เกิด de novo SUI ภายหลังการผ่าตัด ส่วนกลุ่มควบคุม (controls; n = 274) คือสตรี  
ที่ยังคงสามารถกลั้นปัสสาวะได้ภายหลังผ่าตัด โดยทำการจับคู่ในอัตราส่วน 2:1 มีการวิเคราะห์ข้อมูลด้วย logistic regression analysis  
เพื่อประเมินความสัมพันธ์ระหว่างปัจจัยทางคลินิกและประชากรศาสตร์กับการเกิด de novo SUI ภายหลังผ่าตัด โดยมีตัวชี้วัดผลลัพธ์หลักคือ  
การระบุปัจจัยทางคลินิกและประชากรศาสตร์ที่สัมพันธ์กับการเกิด de novo SUI ภายหลังการผ่าตัด POP ในสตรีที่ไม่มีอาการ SUI ก่อนการผ่าตัด

**ผลการศึกษา:** การวิเคราะห์แบบ univariate analysis พบว่าอายุ <65 ปี, BMI >27 kg/m<sup>2</sup>, chronic obstructive pulmonary disease  
(COPD), chronic constipation และอาการ voiding dysfunction มีความสัมพันธ์กับการเกิด de novo SUI อย่างมีนัยสำคัญทางสถิติ  
เมื่อทำการวิเคราะห์แบบ multivariate analysis พบว่า BMI >27 kg/m<sup>2</sup> (adjusted OR 2.62; 95% CI 1.04–6.60; p = 0.041) และ  
chronic constipation (adjusted OR 2.65; 95% CI 1.67–4.21; p < 0.001) ยังคงเป็น independent predictors ของการเกิด de novo  
SUI ขณะที่ปัจจัยอื่นไม่พบความสัมพันธ์อย่างมีนัยสำคัญหลังการปรับค่ารวม

**สรุป:** BMI ที่สูง และ chronic constipation เป็นปัจจัยเสี่ยงสำคัญต่อการเกิด postoperative de novo SUI ผลการศึกษานี้เน้นย้ำถึง  
ความสำคัญของการประเมินความเสี่ยงก่อนผ่าตัดแบบเฉพาะราย โดยปัจจัยดังกล่าวอาจนำไปใช้ประกอบการตัดสินใจทางศัลยกรรม รวมถึง  
การพิจารณาเลือกทำ concomitant anti-incontinence procedures ในผู้ป่วยที่มีความเสี่ยงสูง การจัดการปัจจัยเสี่ยงที่สามารถปรับเปลี่ยน  
ได้ก่อนการผ่าตัดอาจช่วยลดการเกิด de novo SUI และเพิ่ม quality of life ในสตรีที่เข้ารับการผ่าตัดฟื้นฟูอวัยวะอุ้งเชิงกราน

**คำสำคัญ:** ภาวะปัสสาวะเล็ดจากแรงดันที่เกิดขึ้นใหม่, การผ่าตัดแก้ไขภาวะอวัยวะอุ้งเชิงกรานหย่อน, ปัจจัยเสี่ยง, ภาวะท้องผูกเรื้อรัง,  
ดัชนีมวลกาย

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\*Corresponding author: Teerapan Seehanantawong, E-mail: frame044@gmail.com

## Abstract

**Objective:** To identify risk factors associated with the development of de novo stress urinary incontinence (SUI) in continent women undergoing pelvic organ prolapse (POP) surgery.

**Methods:** A retrospective case-control study was conducted at Maharaj Nakhon Ratchasima Hospital, a tertiary care center. Medical records of women who underwent POP surgery between June 2014 and June 2024 were reviewed. A total of 411 patients were included. Cases ( $n = 137$ ) were defined as women who developed de novo SUI after surgery, whereas controls ( $n = 274$ ) were continent women matched at a 2:1 ratio. Logistic regression analyses were performed to evaluate associations between clinical and demographic variables and the occurrence of postoperative de novo SUI. The main outcome measures are identification of clinical and demographic factors associated with the development of de novo SUI following POP surgery in previously continent women.

**Results:** In univariate analysis, age  $<65$  years, BMI  $>27$  kg/m<sup>2</sup>, chronic obstructive pulmonary disease (COPD), chronic constipation, and voiding dysfunction symptoms were significantly associated with de novo SUI. In the multivariate model, BMI  $>27$  kg/m<sup>2</sup> (adjusted OR 2.62; 95% CI 1.04–6.60;  $p = 0.041$ ) and chronic constipation (adjusted OR 2.65; 95% CI 1.67–4.21;  $p < 0.001$ ) remained independent predictors, whereas other variables did not retain statistical significance.

**Conclusions:** High BMI and chronic constipation were identified as significant risk factors for postoperative de novo SUI, underscoring the importance of tailored preoperative risk assessment. These predictors may inform surgical decision-making, including selective consideration of concomitant anti-incontinence procedures in high-risk individuals. Addressing modifiable risk factors prior to surgery may reduce the occurrence of de novo SUI and improve quality of life in women undergoing pelvic reconstructive surgery.

**Keywords:** de novo stress urinary incontinence, pelvic organ prolapse surgery, risk factors, chronic constipation, body mass index

## Introduction

Pelvic organ prolapse (POP) is a prevalent condition among older women, with up to 50% experiencing some form of prolapse during their lifetime [1]. Its clinical significance lies not only in anatomical displacement but also in its impact on urinary function, including the frequent co-occurrence of stress urinary incontinence (SUI) [2]. The anatomical changes caused by anterior vaginal wall prolapse may result in urethral kinking, which temporarily preserves continence in some women [3]. However, surgical correction of POP can relieve this obstruction and unmask underlying urethral dysfunction, leading to postoperative de novo stress urinary incontinence (de novo SUI) [4].

De novo SUI refers to the onset of urinary leakage symptoms—typically associated with exertion or increased intra-abdominal pressure—that arise after prolapse repair in women who were continent preoperatively [5]. This phenomenon has been reported in approximately 16% to 51% of women undergoing pelvic floor reconstructive surgery without concurrent anti-incontinence procedures [6,7].

The underlying mechanisms contributing to de novo SUI include both structural and functional factors, such as urethral hypermobility, reduced urethral pressure, and preoperative occult SUI (OSUI) which may not be detectable without specific urodynamic provocation tests [8]. The diagnosis of OSUI often requires bladder prolapse repositioning or pressure-induced testing before surgery [9]. Nevertheless, not all cases of postoperative SUI can be attributed to previously undetected OSUI, emphasizing the multifactorial etiology of de novo SUI [10].

Recent studies have identified several potential risk factors for developing de novo SUI postoperatively, including lower urinary tract obstruction (LUTO), high Aa-point values (anterior vaginal wall descent), previous hysterectomy, and specific modes of prolapse surgery such as tension-free vaginal mesh (TVM) [7,11]. Among these, LUTO—diagnosed via

urodynamic testing—has emerged as an independent and statistically significant predictor of postoperative de novo SUI [12].

Given the clinical implications of de novo SUI on postoperative quality of life, it is essential to identify preoperative risk factors that may inform surgical decision-making and patient counseling. This study aims to investigate the risk factors associated with the development of de novo SUI in women undergoing pelvic organ prolapse surgery, as well as to determine its incidence rate in this population.

## Method

### Primary objective

To identify risk factors associated with the development of de novo stress urinary incontinence (SUI) in women undergoing pelvic organ prolapse (POP) surgery.

### Study design

Case-control study

### Study schedule

This study was conducted following approval from the Ethics Committee of Maharat Nakhon Ratchasima Hospital, Nakhon Ratchasima, Thailand. It was designed as a retrospective case-control study aimed at identifying the risk factors associated with the development of de novo stress urinary incontinence (SUI) following pelvic organ prolapse (POP) surgery.

### Study setting and population

Eligible participants were identified from the medical records of patients who underwent POP surgery performed by certified obstetricians and gynecologists at Maharat Nakhon Ratchasima Hospital. The identification process utilized institutional surgical databases and electronic medical record systems by querying surgical procedure codes and patient medical record numbers related to POP surgeries.

**Inclusion criteria**

Female patients diagnosed with stage II or greater pelvic organ prolapse, confirmed via pelvic examination or imaging according to the POP-Q and Baden classification. No preoperative symptoms of stress urinary incontinence (SUI). Underwent one or more of the following surgical procedures:

- Anterior colporrhaphy
- Posterior colporrhaphy
- Vaginal hysterectomy
- Total colpocleisis
- Partial Colpocleisis

**Exclusion criteria**

1. History of anti-incontinence surgery – Patients who have undergone any form of anti-SUI surgical procedure (e.g., midurethral sling, Burch colposuspension) either previously or concurrently with the index POP surgery.

2. Inadequate medical records or missing critical data

3. Postoperative complications that affect urinary function evaluation

- a. urinary retention requiring catheter reinsertion
- b. vesicovaginal fistula
- c. surgical site infection

4. Prior pelvic irradiation (e.g., for gynecological cancers) may alter tissue compliance and bladder function, leading to confounding urinary outcomes.

**Postoperative follow-up**

Patients who do not experience any immediate postoperative complications and are able to void spontaneously after removal of the Foley catheter will be discharged. At 2 weeks post-surgery, all patients will undergo a standardized postoperative evaluation during a scheduled outpatient follow-up visit. This assessment will include clinical examination and symptom review, with a particular focus on lower urinary tract symptoms (LUTS), including the presence or absence of de novo SUI.

**Main outcome measure**

The primary outcome of this study is the incidence and identification of risk factors associated with de novo stress urinary incontinence (SUI) in women undergoing pelvic organ prolapse (POP) surgery who were continent preoperatively. De novo SUI is defined as the onset of involuntary leakage of urine on effort, exertion, sneezing, or coughing, reported by patients after surgery, with no prior history or symptoms of SUI before the operation. Confirmation will be based on:

- Patient self-report during the 2-week postoperative follow-up visit
- Review of postoperative clinical records indicating the emergence of stress-related urinary leakage

Patients meeting this definition were classified as cases. Controls were patients who remained continent postoperatively. The outcome was analyzed to evaluate its association with preoperative demographic, clinical, and anatomical variables.

**Control group selection**

Potential controls were selected from patients who underwent pelvic organ prolapse (POP) surgery during the same time period as the cases but did not develop postoperative stress urinary incontinence (SUI). Controls were matched to cases at a 2:1 ratio based on the time period of surgery to minimize confounding due to changes in surgical techniques or clinical practices over time.

**Data collection**

A standardized data abstraction form was used to collect relevant clinical information from patient medical records. The following preoperative variables were recorded:

- Age
- Parity
- Body mass index (BMI)
- History of previous prolapse surgery
- History of previous hysterectomy

- Menopausal status
- Presence or absence of preoperative stress urinary incontinence
- Overactive bladder symptoms (wet vs. dry)
- Voiding dysfunction symptoms
- Post-void residual urine volume
- History of urinary tract infection (UTI)

Other relevant medical comorbidities (e.g., diabetes mellitus, chronic obstructive pulmonary disease (COPD), chronic constipation, recurrent urinary tract infections (UTIs), Parkinson's disease, multiple sclerosis)

All data were anonymized prior to analysis to protect patient confidentiality and were securely stored in compliance with institutional data protection guidelines.

#### Data analysis/ statistical analysis:

Univariate analysis was performed to determine significant differences in demographic, surgical, and postoperative factors between the cases and the controls. The  $\chi^2$  and Fisher's exact tests were used for categorical variables, and the T-test and Wilcoxon rank-sum test were used for continuous variables.

Conditional logistic regression was performed to determine unadjusted odds ratios (ORs) and 95% confidence intervals (CIs) for significant single predictors. Predictors that were univariately associated with the outcome were included in a multivariate logistic regression to identify independent predictors of de novo SUI.

## Results

A total of 411 women who underwent pelvic organ prolapse surgery were included in the final analysis. Of these, 137 patients (33.3%) developed de novo stress urinary incontinence (SUI) postoperatively and were classified as cases, while 274 patients (66.7%) remained continent and served as controls, resulting in a case-to-control ratio of 1:2.

The mean age of the study population was  $68.3 \pm 10.7$  years. The overall mean body mass index (BMI) was approximately  $23.3 \text{ kg/m}^2$ . Regarding pelvic organ prolapse severity, the majority of patients had advanced-stage prolapse (stage III–IV) in all compartments. Preoperative lower urinary tract symptoms were common; voiding difficulty symptoms were reported in approximately one-third of patients. Among medical comorbidities, chronic constipation and diabetes mellitus were frequently observed, whereas chronic obstructive pulmonary disease (COPD) and overactive bladder (OAB) symptoms were present in a smaller proportion of the cohort.

Most patients underwent anterior and posterior colporrhaphy, and approximately 70% received concomitant vaginal hysterectomy. Intraoperative and early postoperative complications were uncommon. All patients included in the analysis were continent preoperatively and were evaluated for the presence of de novo SUI during standardized postoperative follow-up.

**Table 1** Characteristic of all patients. (n= 411)

| DEMOGRAPHIC                                              | DATA (N)                         |
|----------------------------------------------------------|----------------------------------|
| AGE, MEAN $\pm$ SD (range)                               | 68.3 $\pm$ 10.7                  |
| BMI, MEAN $\pm$ SD (range)                               | 23.3 $\pm$ 2.9 kg/m <sup>2</sup> |
| <b>Stage of POP, anterior</b>                            |                                  |
| - Early stage of anterior compartment (stage I, II)      | 61 (14.8)                        |
| - Advance stage of anterior compartment (stage III, IV)  | 350 (85.2)                       |
| <b>Stage of POP, apical</b>                              |                                  |
| - Early stage of apical compartment (stage I, II)        | 79 (19.2)                        |
| - Advance stage of apical compartment (stage III, IV)    | 332 (80.8)                       |
| <b>Stage of POP, posterior</b>                           |                                  |
| - Early stage of posterior compartment (stage I, II)     | 73 (17.8)                        |
| - ADVANCE STAGE OF POSTERIOR COMPARTMENT (stage III, IV) | 338 (82.2)                       |
| <b>Clinical LUTS finding before surgery</b>              |                                  |
| - Voiding difficulty symptoms                            | 131 (31.9)                       |
| - OAB                                                    | 87 (21.2)                        |
| <b>Underlying disease</b>                                |                                  |
| - Diabetes mellitus                                      | 82 (20.0)                        |
| - Chronic obstructive pulmonary disease (copd)           | 35 (8.5)                         |
| - Chronic constipation                                   | 122 (29.7)                       |
| - Recurrent urinary tract infections (utis)              | 22 (5.3)                         |
| <b>Surgical parameters</b>                               |                                  |
| - Duration of surgery, mean $\pm$ sd (range)             | 110.2 $\pm$ 17.7                 |
| - Intra-operative blood loss, mean $\pm$ sd (range)      | 152.3 $\pm$ 46.2                 |
| - Anterior colporrhaphy                                  | 407 (99)                         |
| - Posterior colporrhaphy                                 | 391 (95.1)                       |
| - Vaginal hysterectomy                                   | 289 (70.3)                       |

**Univariate analysis**

In univariate analysis, several preoperative factors were significantly associated with the development of de novo stress urinary incontinence (SUI). Patients who developed de novo SUI were more likely to be younger than 65 years (OR 3.57, 95% CI 2.19–5.82,  $p < 0.001$ ) and to have a body mass index (BMI) greater than 27 kg/m<sup>2</sup> (OR 3.94, 95% CI 2.38–6.53,  $p < 0.001$ ).

Among comorbid conditions, chronic obstructive pulmonary disease (COPD) (OR 2.60, 95% CI 1.29–5.23,  $p = 0.008$ ) and chronic constipation (OR 2.95, 95% CI 1.90–4.59,  $p < 0.001$ ) were significantly associated with de novo SUI, whereas diabetes mellitus and recurrent urinary tract infection were not.

Regarding pelvic organ prolapse severity, advanced-stage prolapse in the anterior, apical, or posterior compartments was not associated with the development of de novo SUI.

Among preoperative lower urinary tract symptoms, voiding dysfunction symptoms were significantly associated with de novo SUI (OR 2.63, 95% CI 1.71–4.05,  $p < 0.001$ ), whereas overactive bladder symptoms were not (OR 1.32, 95% CI 0.81–2.15,  $p = 0.26$ ).

**Table 2** Univariate and multivariate analysis of the association of demographic data, stage of pelvic organ prolapses surgical parameters with presence of de novo SUI after pelvic organ prolapse surgery.

| Parameter                                              | Univariate analysis |         | Multivariate analysis |         |
|--------------------------------------------------------|---------------------|---------|-----------------------|---------|
|                                                        | OR (95% CI)         | p-value | OR (95% CI)           | p-value |
| <b>Patient characteristic</b>                          |                     |         |                       |         |
| <b>Age</b>                                             |                     |         |                       |         |
| - (Age < 65 Vs ≥65)                                    | 3.57 (2.19–5.82)    | <0.001  | 1.44 (0.58–3.53)      | 0.43    |
| <b>Body mass index</b>                                 |                     |         |                       |         |
| - BMI > 27 kg/m <sup>2</sup> Vs < 27 kg/m <sup>2</sup> | 3.94 (2.38–6.53)    | <0.001  | 2.62 (1.04–6.60)      | 0.041   |
| <b>Comorbidity</b>                                     |                     |         |                       |         |
| - DM                                                   | 1.05 (0.63–1.74)    | 0.86    |                       |         |
| - COPD                                                 | 2.60 (1.29–5.23)    | 0.008   | 2.06 (0.97–4.38)      | 0.061   |
| - Constipation                                         | 2.95 (1.90–4.59)    | <0.001  | 2.65 (1.67–4.21)      | <0.001  |
| - UTI                                                  | 0.93 (0.37–2.34)    | 0.88    |                       |         |
| <b>Stage of pelvic organ prolapse</b>                  |                     |         |                       |         |
| Anterior Compartment                                   |                     |         |                       |         |
| - Early Vs Advance stage                               | 0.94 (0.53–1.67)    | 0.84    |                       |         |
| Apical Compartment                                     |                     |         |                       |         |
| - Early Vs Advance stage                               | 0.95 (0.57–1.60)    | 0.86    |                       |         |
| Posterior Compartment                                  |                     |         |                       |         |
| - Early Vs Advance stage                               | 1.20 (0.69–2.07)    | 0.52    |                       |         |
| Pre-operative LUT Symptoms                             |                     |         |                       |         |
| - Voiding dysfunction symptoms                         | 2.63 (1.71–4.05)    | <0.001  | 0.72 (0.45–1.18)      | 0.19    |
| - OAB                                                  | 1.32 (0.81–2.15)    | 0.26    |                       |         |

OAB = Overactive Bladder

Pre-operative LUT = Pre-operative lower urinary tract symptoms

### Multivariate analysis

Variables that were significant in univariate analysis (age <65 years, BMI >27 kg/m<sup>2</sup>, COPD, chronic constipation, and voiding dysfunction symptoms) were entered into a multivariate logistic regression model.

After adjustment for potential confounders, BMI >27 kg/m<sup>2</sup> (adjusted OR 2.62, 95% CI 1.04–6.60,  $p = 0.041$ ) and chronic constipation (adjusted OR 2.65, 95% CI 1.67–4.21,  $p < 0.001$ ) remained independently associated with the development of de novo SUI.

Age <65 years was no longer significantly associated with de novo SUI after adjustment (adjusted OR 1.44, 95% CI 0.58–3.53,  $p = 0.43$ ). Similarly, COPD showed a borderline but non-significant association (adjusted OR 2.06, 95% CI 0.97–4.38,  $p = 0.061$ ), and voiding dysfunction symptoms were not independently associated with de novo SUI in the multivariate model (adjusted OR 0.72, 95% CI 0.45–1.18,  $p = 0.19$ ).

### Discussion

This retrospective case-control study investigated risk factors associated with the development of de novo stress urinary incontinence (SUI) in women undergoing pelvic organ prolapse (POP) surgery. Using multivariate logistic regression analysis, we identified two independent risk factors: body mass index (BMI) > 27 kg/m<sup>2</sup> and chronic constipation. These findings have important implications for preoperative risk stratification and patient counseling in women who are continent prior to surgery.

De novo SUI refers to the new onset of involuntary urine leakage during effort, exertion, sneezing, or coughing following pelvic reconstructive surgery in previously continent women [2]. It is hypothesized to result from the correction of anatomical distortion, which may have previously masked intrinsic urethral sphincter insufficiency by creating functional urethral kinking or compression [3,4]. Once this anatomic obstruction is relieved surgically, latent urethral dysfunction may manifest as overt SUI. This mechanistic

model highlights the importance of identifying patient-specific risk factors that predispose individuals to unmasking of occult dysfunction following prolapse correction.

One of the most significant findings in this study is the strong association between BMI > 27 kg/m<sup>2</sup> and the development of de novo SUI. Obesity is known to exert chronic intra-abdominal pressure, which can impair pelvic floor support and contribute to urethral hypermobility, thereby increasing the risk for stress incontinence [13]. Wei et al. also demonstrated that higher BMI was a significant predictor of postoperative SUI in continent women undergoing vaginal prolapse repair without anti-incontinence procedures [6]. Our study supports these findings and further emphasizes the role of BMI as a modifiable risk factor, which may be addressed preoperatively through lifestyle intervention or counseling.

Another independent predictor identified in our cohort was chronic constipation. The repetitive straining associated with constipation may exert downward mechanical forces on the pelvic floor, weakening the levator ani muscles and endopelvic fascia, and contributing to the development of SUI. Fatton proposed that chronic constipation can exacerbate the functional load on the pelvic floor and predispose to lower urinary tract dysfunction, especially following prolapse repair [8]. In our study, women with chronic constipation had nearly three-fold increased odds of developing de novo SUI postoperatively. These findings underscore the importance of recognizing bowel dysfunction as a potentially modifiable contributor to postoperative morbidity.

Several variables, including younger age (<65 years), COPD, and preoperative voiding dysfunction symptoms, were significantly associated with de novo SUI in univariate analysis but did not remain significant in the multivariate model. COPD, characterized by chronic cough and pressure fluctuations, has previously been suggested as a risk factor for SUI due to repetitive stress on pelvic structures [12]; however,

consistent associations have not been universally observed. In our cohort, COPD demonstrated a borderline relationship ( $p = 0.061$ ), suggesting a potential contributory effect that warrants further investigation in larger cohorts. Similarly, the presence of voiding dysfunction symptoms may intuitively suggest occult lower urinary tract pathology, but their predictive value has been questioned. Visco, et al. found that such symptoms were not reliable indicators of latent SUI in preoperative assessments, particularly when urodynamic studies were not performed with prolapse reduction [3]. Our findings align with this evidence, as voiding dysfunction did not retain significance after adjustment.

Although this study collected comprehensive data on POP severity across compartments (anterior, apical, posterior), we did not identify a significant association between POP stage and de novo SUI. However, it is important to note that the distribution of prolapse severity was heavily skewed, with over 80% of patients presenting with advanced-stage prolapse in all compartments. This significant imbalance likely limited statistical power to detect meaningful associations, particularly for early-stage prolapse. According to epidemiologic principles, such disparity in exposure categories can compromise the stability of regression estimates and increase the likelihood of type II error when subgroup sample sizes are insufficient [14]. Thus, the absence of association should be interpreted with caution and not as definitive evidence of no relationship. Future studies should aim for balanced recruitment across POP stages to more accurately assess this potential risk factor.

From a clinical perspective, our findings highlight the value of preoperative risk stratification in women undergoing POP surgery. Identifying patients with elevated BMI or chronic constipation—both of which independently predict de novo SUI—provides an opportunity for targeted prehabilitation, including weight optimization and bowel management. In high-risk individuals, concomitant anti-incontinence procedures may be considered, particularly when the risk of

untreated postoperative incontinence is likely to impact quality of life. These interventions should be individualized and informed by shared decision-making, balancing the benefits of preventive strategies with the risks of overtreatment.

Future research should focus on addressing the limitations inherent in case-control designs, particularly the inability to estimate absolute risk and the underrepresentation of early-stage POP. Prospective, multicenter studies with balanced exposure groups, incorporation of urodynamic assessments with prolapse reduction, and extended follow-up periods are essential to validate these findings. Ultimately, combining clinical predictors with objective testing and patient-reported outcomes will be key to advancing personalized surgical planning and improving continence-preserving strategies in pelvic reconstructive care.

## Conclusion

This study identified body mass index (BMI) greater than 27 kg/m<sup>2</sup> and chronic constipation as independent preoperative risk factors for the development of de novo stress urinary incontinence (SUI) following pelvic organ prolapse (POP) surgery in previously continent women. While several other variables—such as younger age, COPD, and voiding dysfunction symptoms—showed significant associations in univariate analyses, they did not retain statistical significance after adjustment for confounders. These findings underscore the multifactorial nature of de novo SUI and highlight the importance of comprehensive preoperative assessment.

Given the impact of postoperative SUI on patient quality of life, clinicians should consider incorporating risk stratification into preoperative counseling and surgical planning. In patients with elevated BMI or chronic constipation, targeted interventions such as weight management and bowel regimen optimization may be beneficial prior to surgical intervention. Additionally, these risk factors may help guide the consideration of concomitant

anti-incontinence procedures during prolapse repair. Future prospective studies with larger and more diverse populations, balanced representation of POP severity stages, and the inclusion of objective urodynamic evaluations are warranted to validate these findings and further elucidate mechanisms underlying postoperative SUI. Integrating clinical, functional, and anatomical data may ultimately enhance individualized patient care and optimize surgical outcomes in pelvic reconstructive surgery.

### Conflict of Interest

The authors declared no conflict of interest.

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