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Original article

The choice of reoperation after primary surgeries for uterine prolapse: A nationwide study

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ABSTRACT

Objective: Our previous study described the increasing adoption of uterine-preserving procedures in the surgical approach for uterine prolapse. In this follow-up study, we further explored the reoperation rate and variables for the choice of surgeries after primary uterine prolapse surgery, based on the nationwide claim data in Taiwan.

Materials and methods: The data of this study was obtained from the Inpatient Expenditures by Admission files of the National Health Insurance Research Database (NHIRD). Women who received primary and repeat surgeries, either hysteropexy or hysterectomy, were identified between 1997 and 2010; and followed up to 2010 or till the event of reoperation. We analyzed the variables including the primary surgical type, concomitant stress urinary incontinence (SUI) surgery, patient age, surgeon age, and hospital accreditation level.

Results: Among the total 36,609 women, a higher reoperation rate was noted in the hysteropexy group (156/4095) (3.81%) than in the hysterectomy group (116/32,514) (0.36%); the adjusted odds ratio (OR) was 11.70 [95% confidence interval (CI): 8.86–15.43]. It was lower in patients with concomitant SUI surgery; older patients (aged $\geq$ 60 years and 40–69 years vs. < 40 years); older surgeons (aged $\geq$ 50 years and 40–49 years vs. < 40 years), but not significant in hospital levels. Hysterectomy was the preferred choice as compared with repeat hysteropexy (69.87% vs. 30.13%) among the failed hysteropexy group. All variables for the choice of repeat hysteropexy were not significant.

Conclusion: Our study offers a population-based nationwide observation that hysteropexy correlates with a higher reoperation rate, as compared with hysterectomy; but it is still as high as 30% in the surgical choice of the failed hysteropexy group.

Introduction

Uterine prolapse, an apical defect of pelvic organ prolapse (POP), is a commonly encountered women's health issue with a negative impact on a patient's quality of life.[1] The lifetime risk of undergoing prolapse or continence surgery is 11.1%,[2] which increases as the life expectancy increases. The number of surgeries for urinary incontinence and POP will increase substantially over the next 40 years according to a forecasting study.[3] Traditionally, repair of POP with a concomitant hysterectomy is considered the "standard of care" for uterovaginal prolapse. As early as 1934, Bonney[4] suggested that descent of the uterus is the consequence, and not the cause, of uterine prolapse. The pathological cause of uterine prolapse is loss of integrity of the uterosacral and cardinal ligament complex and a weakening of the pelvic floor diaphragm.[5] Uterine prolapse can result from any defect of the following: the constriction of the bottom of the vagina, the suspension of the uterosacral and cardinal ligament, and flap valve closure against the pelvic wall; hence, removing the uterus to treat POP does not appear logical.[4] Therefore, whether hysterectomy remains as the "standard of care" in modern gynecologic practice remains debatable. Moreover, women

Conflicts of interest: All authors declare that there are no conflicts of interest.

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opted to preserve the uterus for reasons such as the desire to maintain future fertility, the belief that the uterus affects sexual function or sense of identity, an increase in conservative treatment for menorrhagia, concern about the risks of hysterectomy, and the length of recuperation.[6]

Our previous study described the changing trends of surgical approaches for POP in Taiwan, and presented an account of the increasing use of hysteropexy with uterine preservation during recent years.[7] Although POP is often considered a condition of the elderly, a national census and survey in the United States reported the surgical distribution rates according to age group: prolapse surgical rates (per 10,000 women) were seven, 24, 31, and 17 in reproductive age, perimenopausal, postmenopausal, and elderly age groups, respectively.[8] It suggests that POP is a condition affecting women across the reproductive life cycle and for which women of all ages seek surgical treatment. In recent years, interest in uterine preservation has been growing worldwide. According to a recent multicenter, cross-sectional study, a higher proportion of women with symptomatic prolapse preferred to retain the uterus at the time of surgery in the absence of a substantial benefit of hysterectomy.[9] Today, more uterus-preserving procedures are used to treat POP; uterine preservation is now feasible during pelvic reconstructive surgeries.[10,11] After our initial observation of an increasing use of hysteropexy with uterine preservation in treating uterine prolapse, we further explored the reoperation rates and the variables of surgical type, either hysterectomy or hysteropexy, for the failed primary surgery for uterine prolapse; also, we tried to identify the variables of the choices of repeat hysteropexy among the failed hysteropexies, based on the National Health Insurance (NHI) claims data.

Materials and methods

Data source

The data used in this study were obtained from the National Health Insurance Research Database (NHIRD). The NHIRD was established by the National Health Research Institute, in cooperation with the NHI Bureau, with the aim of undertaking research into current and emerging issues in Taiwan. The details of the NHIRD were described in our previous report.[7] Briefly, NHIRD offered the information of NHI-reimbursed hospital discharges on inpatient characteristics, the dates of admission and discharge, the type of disease, and the surgery code (based upon the International Classification of Diseases, 9th Revision, Clinical Modification, ICD-9-CM). Anonymous identifiers of the medical institutions and physicians were used to link the hospital discharge data to the physician and hospital registries. Confidentiality assurances were ensured abiding by data regulations of the NHI Bureau. We consulted with the Institutional Review Board of Chi Mei Foundation Hospital, Tainan, Taiwan and obtained a formal written waiver for the need of ethics approval (No. 10202-E08).

Study participants

Study participants were women who had NHI and received primary surgeries, either hysteropexy with uterine preservation, or hysterectomy with/without colpopexy, due to the diagnosis of uterine prolapse in Taiwan between January 1, 1997 and December 31, 2010. A diagnosis of uterine prolapse included ICD-9 CM diagnosis codes 618.1 for uterine prolapse without mention of vaginal wall prolapse; 618.2 for uterovaginal prolapse, incomplete; 618.3 for uterovaginal prolapse, complete; and 618.4 for uterovaginal prolapse, unspecified, but not vaginal vault prolapse (618.5 prolapse of the vaginal vault after a hysterectomy). The surgical approaches received by the women for uterine prolapse were categorized as follows: (1) hysteropexy with uterine preservation (hysteropexy group): ICD-9 CM operation code 69.22 for other uterine suspension, including a hysteropexy, Manchester operation, and plication of uterine ligament; and (2) hysterectomy with/without colpopexy (hysterectomy group): ICD-9 CM operation code 70.77 for vaginal suspension and fixation. A concomitant hysterectomy included any of the following: a subtotal (supracervical) abdominal hysterectomy (SAH; 68.3); a total abdominal hysterectomy (TAH; 68.4); laparoscopic hysterectomy (LH; 68.51, or 68.5 vaginal hysterectomy with 54.21 laparoscopy); and a vaginal hysterectomy (VH; 68.59, or 68.5 vaginal hysterectomy without 54.21 laparoscopy). A concomitant stress urinary incontinence (SUI) surgery was described as plication of the urethra-vesical junction, e.g., a Kelly-Kennedy operation (59.3); a suprapubic sling operation, e.g., Goebel-Frangenheim-Stoeck suspension (59.4); retropubic urethral suspension, e.g., a Marshall-Marchetti-Kranz (MMK) operation, Burch procedure (59.5); paraurethral suspension (needle suspension), e.g., Pereyra suspension (59.6); injection of an implant into the urethral and/or bladder neck, e.g., collagen implant (59.72); and others (59.79), e.g., abdominal perineal urethral suspension (APUS), midurethral sling, etc.

Thereafter, we followed these women until the event of reoperation after failed primary surgery or the end of 2010. The women receiving repeat surgeries after failed primary surgery for a uterine prolapse were further categorized into either repeat hysteropexy or hysterectomy as a treatment modality; while colpopexy (vaginal suspension) was the only treatment of the failed hysterectomy group. The failure (reoperation) rate was defined as the proportion of repeat surgery (i.e. failed surgeries and need repeat surgery), over primary surgery.

Variable definitions

We identified the variables including primary surgical type, concomitant SUI surgery, patient age, surgeon age, surgeon gender, and hospital accreditation level. The variables used in this study fell into the following categories: (1) primary surgical type, either hysterectomy with/without colpopexy, or hysteropexy with uterine preservation; (2) concomitant SUI surgery; (3) patient age, which was divided into three age groups, i.e., < 40 years, 40–59 years, and ≥ 60 years of age; (4) surgeon characteristics (age and gender), the surgeon's age was divided into three groups, < 40 years, 40–49 years, and ≥ 50 years; and (4) hospital accreditation levels, the hospitals are accredited by the Taiwan Joint Commission on Hospital Accreditation (TJCHA) which is supervised by the Department of Health, Executive Yuan (Taiwan), and classified into three levels (medical centers, regional hospitals, and local hospitals) based on health care quality, medical teaching ability, clinical capabilities, and bed capacity.[7]

Statistical analysis

Chi-square tests were performed to examine differences in the repeat surgery distribution of the two types of surgeries. The Student *t* test was performed to examine the interval between the primary and repeat surgery of the two types of surgeries, hysterectomy or hysteropexy. A crude and multiple logistic regression were used to examine the independent effects of each individual variable for the failed surgeries for uterine prolapse, i.e., primary surgical type (hysteropexy or hysterectomy), concomitant SUI surgery, patient age, surgeon age and gender, and hospital accreditation level. The comparison of variables of the choices of repeat hysteropexy among the failed hysteropexy group was also performed. The significance of the statistics was determined using

$p < 0.05$. All analyses in this study were carried out using SAS system software (SAS Institute, Cary, NC, U.S.A.) for Windows (version 9.3.1).

Results

In total, 36,609 women received the primary surgeries for uterine prolapse were identified. Of them, 32,514 (88.8%) received the hysterectomy with/without colpopexy (hysterectomy group); while 4095 of them (11.2%) received hysteropexy with uterine preservation (hysteropexy group). During the study period, these women were followed till the event of reoperation after failed primary surgery or the end of 2010, with a mean interval of 97.64 ± 83.04 months (Table 1). A higher reoperation (failure) rate was noted in the hysteropexy group, 3.81% (156/4095) vs. 0.36% (116/32,514), $p < 0.0001$; and a borderline shorter interval till reoperation, 94.15 ± 80.08 months vs. 115.6 ± 97.12 months, $p = 0.0533$, as compared with the hysterectomy group (Table 1).

After the failed primary surgery, colpopexy (vaginal vault suspension) was done in the entire hysterectomy group. The choices of repeat surgery among the failed hysteropexy group were either hysterectomy (109/156) (69.87%) or repeat hysteropexy (52/156) (33.33%). Hysterectomy remains the main surgery up to two thirds for repeat surgery for uterine prolapse, which is even higher than that in primary surgery (47/156) (30.13%) (Fig. 1).

The comparison of variables for the failed primary surgeries for uterine prolapse is shown in Table 2. The odds ratio (OR) for reoperation was higher in the hysteropexy group than in the hysterectomy group [adjusted OR: 11.70, 95% confidence interval (CI): 8.86–15.43]. The reoperation rate was lower in patients with concomitant SUI surgery (adjusted OR: 0.62, 95% CI: 0.43–0.90).

As for patient age, the reoperation was lower in the > 60 years and 40–59 years age groups as compared with the < 40 years age group; crude ORs 0.31 and 0.19 (95% CI: 0.22–0.42 and 0.14–0.26, respectively); however, the adjusted OR became non-significant—adjusted OR 0.91 (95% CI: 0.65–1.28) and 0.79 (95% CI: 0.54–1.15), respectively. The reoperation was lower in women with concomitant SUI surgery, adjusted OR 0.62 (95% CI: 0.43–0.90). Reoperation was significantly lower in the surgeon age group ≥50 years and 40–49 years as compared with the < 40 years age group; adjusted OR 0.70 (95% CI: 0.52–0.93) and 0.71 (95% CI: 0.51–0.98), respectively. The hospital accreditation level was not significant.

Among the choice of repeat hysteropexy after failed primary surgery among the hysteropexy group, hysterectomy (109/156) was the preferred choice, as compared with repeat hysteropexy (47/156), 69.87% and 30.13.7%, respectively. Though hysterectomy remains the main surgical type for repeat surgery for uterine prolapse, hysteropexy remains up to 30%, which is even higher than that in primary surgery (11.19%) (Fig. 1). The variables for adopting hysteropexy as repeat uterine prolapse surgery were shown in (Table 3). These variables were not significant, including concomitant SUI surgery, patient age, surgeon age, and hospital accreditation level (Table 3).

Table 1
The primary and failed-primary-need-repeat surgery for uterine prolapse.

Surgical types	Primary surgery		Repeat surgery		*p*-value	Interval	*p*-value
	No.	(%)	No.	(%)		(mons)	
Hysterectomy	32,514	88.81	116	0.36	<0.0001	115.6 ± 97.12	0.0533
Hysteropexy	4,095	11.19	156	3.81		94.15 ± 80.08	
Total	**36,609**	**100.00**	**272**	**0.84**		**97.64 ± 83.04**	

Note: Repeat surgery was defined as failed primary surgeries and need repeat surgery.

Discussion

Our study offers a population-based nationwide observation that the primary surgical type, either hysteropexy or hysterectomy, correlates with the reoperation (failure) rate which was defined as failed-primary-need-repeat surgery, after primary surgeries for uterine prolapse. Hysteropexy has a higher reoperation rate, 3.81% vs. 0.36% with an adjusted OR as high as 11.7, as compared with hysterectomy. It is in concordance with the report of Rosen et al,[12] in which preserved uterus (21.4%) during laparoscopic pelvic floor repair has a higher recurrent prolapse, as compared with the hysterectomy group (12.9%). However, hysteropexy still accounts as high as 30% in the choice of repeat surgery in the failed hysteropexy group, which was even higher than that of primary surgery (11.19%). This implies that patients, as well as surgeons, desire the uterine-preserving procedures in treating uterine prolapse.

Reoperation remains the main problem in treating POP. It was reported in as high as 29.2% of patients, and the time intervals between repeat procedures decreased with each successive repair.[2] In our study, a relative low reoperation (failure) rate, was noted after primary surgery for uterine prolapse, with 0.84% for overall, 3.81% for the hysteropexy group, and 0.36% for the hysterectomy group, which is much lower than that in Olsen et al. report.[2] It is obvious that our report underestimates the surgical failure rate, because of the assumption that failed primary surgeries need repeat surgery equal to the failure after primary surgery. It is highly possible that many women may choose nonsurgical conservative treatment afterwards.[13] Patel et al[14] reported an improvement of prolapse-related quality of life and perception of body image in questionnaires of pessary use during 6 months ($p < 0.001$) and 12 months ($p < 0.010$) follow-up, but not in younger women and those with prior prolapse surgery. Although pessaries can treat symptoms in most women, the patient will require lifetime care of the pessary including regular cleaning and replacement.[15] Surgery is an effective treatment but has operative morbidity and a recurrence rate. To assess whether patients prefer surgery or a pessary as treatment for pelvic organ prolapse, Thys et al[13] reported that patients switched preference from pessary to surgery at a median risk of vaginal irritation of 32%, of placing problems of 32%, and of incomplete symptom relief of 17%. Patients tend to prefer surgery when realistic assumptions for advantages and disadvantages are made.[13]

Hysterectomy remains the main surgery for primary uterine prolapse surgery (88.81%), as well as repeat (69.87%) surgery among the failed hysteropexy group. Nevertheless, hysterectomy remains as the “standard of care” in treating POP, because of the understanding that the uterus is believed to be a passive structure in the disease process.[4,5] Therefore, more refined and effective procedures are mandatory and indispensable.[15] Recently, more and more novel surgical approaches make uterine preservation more feasible during pelvic reconstructive surgery.[10,11] Several surgical approaches have been developed via the routes of vaginal, abdominal, laparoscopic, or robotic-assisted procedures, e.g., sacral hysteropexy,[16] uterosacral hysteropexy,[17] sacrospinous hysteropexy,[18] and vaginal mesh hysteropexy.[19,20] In the Gutman and Maher[6] review, sacrospinous hysteropexy (87%, 373/428) is as effective as vaginal hysterectomy and repair (93%, 242/262) in retrospective comparative studies and in a meta-analysis with reduced operating time, blood loss, and recovery time. However, in a single randomized control trial there was a higher recurrence rate associated with sacrospinous hysteropexy compared with vaginal hysterectomy (21% vs. 3%).[21]

Meanwhile, with the widespread use of synthetic mesh via vagina, open laparotomy, laparoscopy,[22] or robotic assisted sacrocolpopexy[23] for the pelvic reconstructive surgery, uterine-

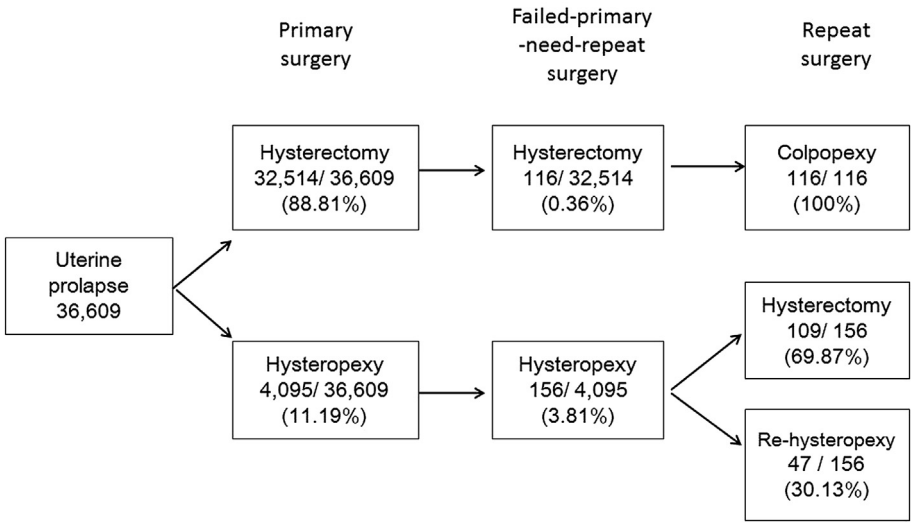

Fig. 1. The choice of hysteropexy or hysterectomy as primary surgery, and repeat surgery after failed primary uterine prolapse surgery.

preserving procedures are becoming more feasible and effective. Sacrospinous hysteropexy with mesh augmentation of the anterior compartment was as effective as hysterectomy and mesh augmentation with no significant difference in the rate of mesh exposure between the groups.[6] Sacral hysteropexy (open or laparoscopic) was as effective as sacral colpopexy and hysterectomy in anatomical outcomes; moreover, performing hysterectomy at sacral colpopexy was associated with a four times higher risk of mesh exposure compared with no-hysterectomy.[6] Therefore, uterine preservation is a viable option for the surgical management of uterine prolapse, but the evidence on safety and efficacy is currently lacking. Jeon et al[24] further points to the use of a graft, rather than hysterectomy, as being necessary for the pelvic reconstructive surgery for uterine prolapse. Whether we expect hysteropexy to fare better than hysterectomy and become the surgical "gold standard" of the future needs further elucidation.[25]

A recent systemic review about robotic-assisted sacrocolpopexy from 27 included articles, with total 1488 surgeries, from 2006 to 2013, reported that the objective and subjective cures ranged from 84% to 100% and from 92% to 95%, respectively. Conversion rate to open surgery was < 1% (range: 0–5%). It is more costly than the laparoscopic procedure. Robotic-assisted sacrocolpopexy is a safe and feasible prolapse repair procedure; it allows the execution of complex surgical steps via minimally invasive surgery without medium- and long-term anatomic detriments.[23] As for transvaginal mesh kits, a recent systemic review by Feiner et al[19] from 30 included studies, a total of 2653 women, reported the objective success rates of two commercial transvaginal mesh kits were either 95% (95% CI 95–96%) or 87% (95% CI 86–87%), respectively. Reoperations not requiring anesthesia occurred in 0.4–2.3% and requiring anesthesia in 1.5–6.0%, with a follow-up between 26 weeks and 78 weeks. Mesh erosion was the most commonly reported complication occurring in 4.6–10.7%.[19] The overall objective success using transvaginal mesh kits in restoring apical vaginal prolapse is high. However, an increasing number of women require surgical intervention for mesh-related complications based on limited data quality and short follow-up.[19]

There were several variables noted for reoperation for the failed primary surgeries. Elderly women had a lower reoperation rate (in the crude OR), as compared with younger patients; which implies that the elder patients opted to choose more conservative

Table 2
The comparison of variables for the failed-primary-need-repeat surgery for uterine prolapse.

		Primary surgery		Repeat surgery		No-repeat surgery		Crude OR (95% CI)	Adjusted OR (95% CI)
		No.	%	No.	%	No.	%		
Primary surgical type	Hysterectomy	32,514	88.81	116	0.36	32,398	99.64	1.00	1.00
	Hysteropexy	4,095	11.19	156	3.81	3,939	96.19	11.06* (8.68–14.10)	11.70* (8.86–15.43)
SUI surgery	No	31,467	85.95	235	0.75	31,232	99.25	1.00	1.00
	Yes	5,142	14.05	37	0.72	5,105	99.28	0.96 (0.68–1.37)	0.62* (0.43–0.90)
Patient age	<40	2,282	6.23	58	2.54	2,224	97.46	1.00	1.00
	40–59	14,706	40.17	117	0.80	14,589	99.20	0.31* (0.22–0.42)	0.91 (0.65–1.28)
	≥60	19,621	53.60	97	0.49	19,524	99.51	0.19* (0.14–0.26)	0.79 (0.54–1.15)
Surgeon age	<40	9,256	25.28	90	0.97	9,166	99.03	1.00	1.00
	40–49	17,011	46.47	116	0.68	16,895	99.32	0.70* (0.53–0.92)	0.70* (0.52–0.93)
	≥50	10,342	28.25	66	0.64	10,276	99.36	0.65* (0.48–0.90)	0.71* (0.51–0.98)
Surgeons gender	Female	3,362	9.18	29	0.86	3,333	99.14	1.00	1.00
	Male	33,247	90.82	243	0.73	33,004	99.27	0.85 (0.58–1.25)	0.71 (0.47–1.06)
Hospital level	Medical center	17,289	47.23	126	0.73	17,163	99.27	1.00	1.00
	Regional	13,279	36.27	107	0.81	13,172	99.19	1.11 (0.85–1.43)	1.01 (0.77–1.32)
	Local	6,041	16.50	39	0.65	6,002	99.35	0.89 (0.62–1.27)	0.89 (0.60–1.31)
Total		36,609	100	272	0.74	36,337	99.26		

Note: Repeat surgery was defined as failed surgeries and need repeat surgery.
*p-value <0.05.

Table 3
The comparison of variables of the choices of repeat hysteropexy among the failed hysteropexy group.

		Hysteropexy gr.		Re-hysteropexy		Hysterectomy		Crude OR (95% CI)	Adjusted OR (95% CI)
		No.	%	No.	%	No.	%		
SUI surgery	No	133	85.26	42	31.58	91	68.42	1.00	1.00
	Yes	23	14.74	5	21.74	18	78.26	0.60 (0.21–1.73)	0.67 (0.22–2.09)
Patient age	<40	57	36.54	22	38.60	35	61.4	1.00	1.00
	40–59	63	40.38	17	26.98	46	73.02	0.59 (0.27–1.27)	0.57 (0.25–1.28)
	≥60	36	23.08	8	22.22	28	77.78	0.46 (0.18–1.18)	0.37 (0.13–1.04)
Surgeon age	<40	46	29.49	14	30.43	32	69.57	1.00	1.00
	40–49	79	50.64	21	26.58	58	73.42	0.83 (0.37–1.85)	0.93 (0.40–2.18)
	≥50	31	19.87	12	38.71	19	61.29	1.44 (0.55–3.76)	1.60 (0.55–4.60)
Surgeons gender	Female	11	7.05	2	18.18	9	81.82	1.00	1.00
	Male	145	92.95	45	31.03	100	68.97	2.03 (0.42–9.75)	1.71 (0.33–8.99)
Hospital level[a]	Medical center	68	43.87	16	23.53	52	76.47	1.00	1.00
	Regional	68	43.87	21	30.88	47	69.12	1.37 (0.65–2.90)	1.23 (0.56–2.73)
	Local	19	12.26	9	47.37	10	52.63	2.75 (0.96–7.90)	2.58 (0.80–8.29)
Total		156	100	47	30.13	109	69.87		

Note: Repeat surgery was defined as failed surgeries and need repeat surgery.
*p-value <0.05.
[a] One case was not available for missing hospital level information, $n = 46$ in this category.

treatment, instead of a better surgical outcome, as compared with younger patients. As for patient preference, Korbly et al[9] reported that if uterine preservation was superior, 46% of the women preferred uterine preservation and 11% of the women preferred hysterectomy. If hysterectomy was superior, 21% of the women still preferred uterine preservation, despite inferior efficacy.[9] Other factors, e.g., college education (OR 2.87; 95% CI 1.08–7.62) and those who believed that the uterus is important for their sense of self (OR 28.2; 95% CI 5.00–158.7) had increased odds for preferring uterine preservation.[9]

As for patient preoperative condition, advanced pelvic organ prolapse correlates with a higher risk of recurrent prolapse after sacrospinous hysteropexy.[6,26] The surgical failure of hysteropexy could be explained by cervical elongation.[12,27] Berger et al[24] showed that one third of women with POP had cervical elongation, and the extent of elongation increases with greater degrees of uterine descent. Cervical elongation is more likely to occur in young and premenopausal patients, and cervical and uterine corpus length decreases as women progress past the menopausal transition.[24] Thereafter, preoperative cervical elongation is a relative contraindication for uterine preservation, and a long cervix may compromise patient satisfaction after a hysteropexy.[24,25] Because of the inherent limitation of our data source, we did not know if cervical elongation affected the surgical decision for uterine prolapse; neither can we distinguish the effect of cervical elongation on the repeat surgery.

One interesting phenomenon is that women with concomitant SUI surgery had a lower reoperation rate. It is more likely that these surgeries were performed by surgeons of urogynecology subspecialties. Meanwhile, the surgeries done by elderly surgeons also had a lower reoperation rate, as compared with younger surgeons. These imply that pelvic reconstructive surgery was more technique-demanding and experience-dependent. Both variables indicate the importance of training courses and experience accumulation. It is in concordance with the Long et al[26] report on the analysis of patient characteristics to identify the predictors of surgical failure after transvaginal mesh. Surgical experience ($p = 0.043$) was one of the two significant predictors of surgical failure, while other factors were not different, e.g., body mass index, POP stage, mesh type, and preoperative urinary symptoms and urodynamic parameters ($p > 0.05$).[26] Surgical-related outcomes have also improved with increased experience in robotic-assisted prolapse surgery, with an estimated learning curve of about 10–20 procedures.[23] As for the choice of hysteropexy as a repeat uterine prolapse surgery in our study, all variables were not significant, including concomitant SUI surgery, patient age, surgeon age, and hospital accreditation level.

As reported in our previous study,[7] there has been a considerable change in the surgical approach for uterine prolapse in Taiwan over the past 11 years. It offers observational data of cases of younger patients (< 50 years), with concomitant SUI surgery, younger surgeons (< 50 years), male surgeons, regional or private hospitals, where uterine-preserving procedures in treating uterine prolapse were more likely to be performed.[7] This study further elucidates the variables for failed-primary-surgery-need-repeat surgery, including hysteropexy, patient age, with concomitant SUI surgery, and surgeon age. As for the choice of reoperation after failed primary hysteropexy group, most preferred to receive hysterectomy, as compared to preserving the uterus. Frick et al[28] reported that the doctor's opinion, risk of surgical complications, and risk of malignancy were the most important factors in surgical decision making in women seeking care for POP. To date, there has been a paucity of high-quality data comparing concomitant hysterectomy with/without colpopexy and hysteropexy with uterus preservation in uterine prolapse repair. Determining the best way to deal with uterine prolapse demands continuous work in prospective controlled trials to guide patient management decisions.[6]

There were several limitations in our study due to the inherent retrospective observational nature. First, the exact procedures performed were not specified, e.g., surgical routes, the use of synthetic mesh, etc. Second, the possibility of miscoding existed due to coding by medical administrative personnel instead of surgeons themselves. Despite these limitations, our study offers population-based nationwide observations on the choice of reoperation after failed primary surgeries for uterine prolapse.

In conclusion, hysteropexy correlates with a higher reoperation rate after failed primary surgeries for uterine prolapse. In addition to surgical type, other variables, including concomitant SUI surgery, patient age, and surgeon age also correlate with the reoperation rate. Among the choice of repeat surgery after failed primary hysteropexy, most preferred hysterectomy; all the variables do not correlate with the choice of repeat surgery among the failed hysteropexy group. However, the demand for a better hysteropexy with uterine preservation from either patients or surgeons is growing. The surgeon's training and practicing experience, patient's preference, and risk of surgical complications are all important factors in surgical decision making. These findings

should provide further impetus to investigate the efficacy of uterine-sparing procedures to help women make informed decisions regarding prolapse surgery.

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