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TRENDS IN PRIMARY AND RE-OPERATION FOR FEMALE STRESS URINARY INCONTINENCE IN TAIWAN: A DESCRIPTIVE NATIONWIDE STUDY

Hypothesis / aims of study

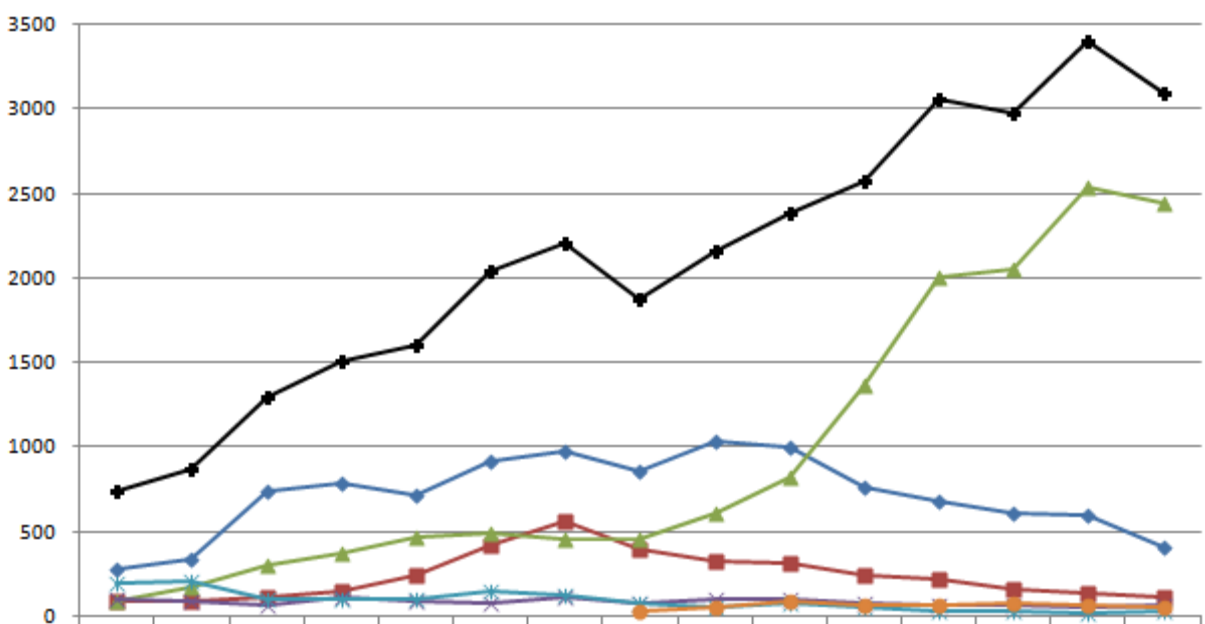
Using the National Health Insurance database in Taiwan, the study aimed to identify the changing trends of primary surgery and the rate and associated factors for re-operation of female stress urinary incontinence.

Study design, materials and methods

A total of 31778 women underwent primary surgeries from 1996 to 2010 for SUI were identified. During this period, we retrieved the patients who had primary surgical treatment from 2000 to 2006. Among these, patients who had a repeat surgery for stress incontinence during a 4-year follow-up duration were identified. The data were analyzed for re-operation rates, surgery methods, patient demography, surgeon and hospital attributes.

Results

The midurethral sling (MUS) was the most common surgical type (45.89%), followed by retropubic urethropexy (RPU; 33.54%) and pubovaginal sling (11.01%). MUS application increased significantly from 11.38 % in 1996 to 78.74 % in 2010. It was associated concomitantly with a decrease in retropubic urethropexy (RPU) from 38.08% to 12.99 %, and pubovaginal sling treatment (PVS) from 11.11 % to 3.46 %. MUS was the most common procedure by both gynecologists and urologists and more commonly performed in medical centers than in regional and local hospitals. SUI surgeries increased in patients aged ≥60, surgeons aged≥50, and in regional hospitals. Among 14613 patients, with a mean follow-up of 86.28±26.76 months, 563 (3.85%) had reoperations, an incidence rate of 54.37 per 10,000 person year. Injection procedures had the highest reoperation rate of 893.30/10,000 PY. The adjusted hazard ratio (HR) of reoperation was higher for mid-urethral sling when compared to pubovaginal sling (HR 1.54, 95% CI 1.16–2.05) or retropubic urethropexy including Burch operation (HR 1.30, 95% CI 1.04–1.61). No correlations were noted between the reoperation rate with patient age, surgeon age, and hospital status. For repeat surgery, the majority of patients chose the same specialty but different surgical types. Mid-urethral sling was used most commonly in 48.85% of reoperations.



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
RPU (59.5)	281	332	732	786	713	914	974	850	1035	993	763	680	608	594	402
PUS (59.4)	82	81	105	143	239	413	558	395	322	307	240	213	158	137	107
MUS (59.79)	84	168	294	375	461	490	450	451	604	819	1365	2003	2047	2535	2437
Kelly (59.3)	95	91	68	105	85	78	106	71	99	102	79	62	66	50	62
Needle (59.6)	196	200	100	97	102	146	120	79	54	71	56	33	24	19	30
Injection (59.72)								26	47	90	68	69	72	63	57
Total	738	872	1299	1506	1600	2041	2208	1872	2161	2382	2571	3060	2975	3398	3095

	Primary		Repeat		Crude HR (95%CI)		Adjusted HR (95% CI)	
	No.	%	No.	%				
Primary surgical types								
RPU open	5,245	35.89	172	3.28	1.15 (0.87–1.51)	Reference	1.19 (0.90–1.57)	Reference
RPU LSC	992	6.79	31	3.13	0.97 (0.64–1.49)	0.85 (0.58–1.25)	1.16 (0.76–1.79)	0.98 (0.66–1.45)
PVS	2,423	16.58	72	2.97	Reference	0.87 (0.66–1.15)	Reference	0.84 0.64–1.11)
MUS	4,527	30.98	170	3.76	1.40 (1.06–1.84)*	1.22 (0.99–1.51)	1.54 (1.16–2.05)*	1.30 (1.04–1.61)*
Vaginal	1,238	8.47	51	4.12	1.38 (0.96–1.97)	1.20 (0.88–1.64)	1.36 (0.94–1.97)	1.14 (0.83–1.58)
Injection	188	1.29	67	35.64	19.53 (13.96–27.33)*	17.03 (12.81–22.64)*	14.09 (8.80–20.91)*	11.86 (8.24–17.06)*
Patient age					0.96 (0.89–1.03)		0.95 (0.89–1.01)	
Surgeon age					1.14 (1.01–1.28)*		1.06 (0.92–1.21)	
Year								
2000	1,589	10.87	74	4.66	Reference		Reference	
2001	2,022	13.84	76	3.76	0.89 (0.64–1.23)		0.90 (0.65–1.25)	
2002	2,162	14.80	90	4.16	1.08 (0.79–1.48)		1.12 (0.82–1.55)	
2003	1,828	12.51	66	3.61	1.03 (0.73–1.45)		0.93 (0.66–1.32)	
2004	2,119	14.50	80	3.78	1.20 (0.86–1.67)		0.99 (0.70–1.39)	
2005	2,326	15.92	81	3.48	1.26 (0.90–1.76)		0.93 (0.66–1.32)	
2006	2,567	17.57	96	3.74	1.50 (1.08–2.07)*		1.07 (0.77–1.50)	
Surgery volume								
Low (0–52)	4,877	33.37	211	4.33	Reference		Reference	
Middle (53–260)	4,990	34.15	230	4.61	1.06 (0.88–1.27)		0.93 (0.75–1.14)	
High (>260)	4,746	32.48	122	2.57	0.57 (0.46–0.71)		0.64 (0.49–0.84)*	
Surgeon gender								
Female	745	5.10	24	3.22	Reference		Reference	
Male	13,868	94.90	539	3.89	1.13 (0.75–1.71)		1.00 (0.66–1.52)	
Specialty								
Gynecology	11,841	81.03	368	3.11	Reference		Reference	
Urology	2,711	18.55	191	7.05	2.32 (1.94–2.76)*		1.50 (1.20–1.86)*	
Others	61	0.42	4	6.56	2.25 (0.84–6.02)*		0.61 (0.22–1.71)	
Accreditation level								
Medical center	9,625	65.87	375	3.90	Reference		Reference	
Regional	4,019	27.50	149	3.71	0.99 (0.82–1.20)		1.03 (0.83–1.28)	
Local	969	6.63	39	4.02	1.07 (0.77–1.49)		1.23 (0.85–1.78)	
Ownership								
Government	3,183	21.78	136	4.27	Reference		Reference	
Non-for-profit	7,707	52.74	302	3.92	0.93 (0.76–1.14)		0.94 (0.76–1.17)	
Private	3,723	25.48	125	3.36	0.81 (0.64–1.04)		0.85 (0.65–1.11)	
Total		14,613	100	563	3.85			

RPU, retropubic urethropexy; RPU LSC, laparoscopic retropubic urethropexy; PVS, traditional pubovaginal sling; MUS, mid-urethral sling; Vaginal, vaginal operations.

Note 1: Patient/surgeon age as continuous variables.

Note 2: "Year" denotes the year in which the primary operations were performed as a predictor for reoperation.

Note 3: Surgery volume is stratified into three groups: high, moderate, and low according to the number of primary operations each surgeon performed in this cohort.

Crude and adjusted HRs for repeat surgery were estimated by Cox proportional hazard models.

*P-value <0.05.

	Repeat												
	RPU open		RPU LSC		PVS		MUS		Vaginal		Injection		Total
Primary	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.
RPU open	51	(29.65)	3	(1.74)	14	(8.14)	97	(56.40)	4	(2.33)	3	(1.74)	172
RPU LSC	11	(35.48)	2	(6.45)	2	(6.45)	15	(48.39)	1	(3.23)	0	(0.00)	31
PVS	19	(26.39)	1	(1.39)	18	(25.00)	29	(40.28)	3	(4.17)	2	(2.78)	72
MUS	23	(13.53)	0	(0.00)	17	(10.00)	108	(63.53)	4	(2.35)	18	(10.59)	170
Vaginal	13	(25.49)	1	(1.96)	8	(15.69)	23	(45.10)	5	(9.80)	1	(1.96)	51
Injection	0	(0.00)	0	(0.00)	1	(1.49)	3	(4.48)	0	(0.00)	63	(94.03)	67
Total	117	(20.78)	7	(1.24)	60	(10.66)	275	(48.85)	17	(3.02)	87	(15.45)	563

RPU, retropubic urethropexy; RPU LSC, laparoscopic retropubic urethropexy; PVS, traditional pubovaginal sling; MUS, mid-urethral sling; Vaginal, vaginal operations.

Interpretation of results

Based on a population-based nation-wide data base, our study observed the significant changes in clinical practice with regard to primary surgeries for SUI. MUS significantly increased up to 78 % in 2010, concomitantly decreasing the numbers of RPU and PVS considerably. This was because it was minimally invasive, easy-to-use, high success rate, and had a rapid convalescent period. Meanwhile, the reimbursement of TVT by the NHI system in Taiwan may explain the transition during 2005–2006. In a population-based cohort study using employer-based health plans in the United States from 2000 to 2009, the 9-year cumulative incidence of repeat surgery after any SUI surgery was 14.5%. In our study with a mean follow-up of 86 months, the overall reoperation rate of 3.85% was relatively low, which may partially be explained by the shorter follow-up duration. However, the incidence rate of 54.37 per 10,000 PY was close to the previously reported figures. Our study identified some possible factors affecting the SUI reoperation rate. The reoperation rates differed according to different primary surgery types. The injection treatment had the highest reoperation rate, however, 94.03% of those who needed reoperation still chose the same treatment in our study. It may possibly due to their preference of less invasive procedures. Our results showed that MUS had higher reoperation

risks relative to RPU. However, the exact sling types of MUS were not identified from the database. Overall, MUS was the most frequently used reoperation. Moreover, the majority of patients who failed the first MUS still chose the same surgical type. On the contrary, most patients who had primary RPU, PVS, or vaginal procedures preferred another method. This suggested the increasing popularity of MUS as the mainstay surgical treatment of female SUI. Certain limitations remain in this study: (1) lack of detailed clinical information, such as the type or severity of the incontinence before and after the primary surgery, conservative therapy or drug treatment prior to the SUI surgery. (2) we were not able to analyze other potential risk factors such as body mass index or parity. (3)
within the same category of surgery, the exact methods were not identified.

Concluding message

The surgical trends for female SUI in Taiwan showed increasing in popularity of MUS. Substantial number of patients need re-operation and the choice of primary surgery type and surgeon specialty may affect the reoperation rates. Mid-urethral sling is the most common re-operation choice.

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Disclosures

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