Comparison of vaginal hysterectomy and tension-free vaginal mesh surgery for pelvic organ prolapsus: review of the first 20 operations performed by a first-time surgeon

Haruhiko Kanasaki, Aki Oride, Kohji Miyazaki

Department of Obstetrics and Gynecology, Shimane University School of Medicine, Izumo, Japan

Abstract

Objective. To review and compare the first 20 cases of vaginal hysterectomy (VH) and tension-free vaginal mesh (TVM) surgery for pelvic organ prolapsus (POP) performed by a first-time surgeon.

Method. Operation time, anesthesia time, intraoperative bleeding volume and number of postoperative days in hospital were compared among the first 20 patients who underwent VH surgery or TVM surgery.

Results. Operation time was 113.65±29.44 min in the VH group and 88.70±22.65 min in the TVM group, with the latter being significantly shorter. Anesthesia time was also significantly shorter in the TVM group. Intraoperative bleeding volume was ≤30 mL in 1 patient in the VH group, while the mean of the remaining 19 patients was 133.68±83.81 mL. In the TVM group, 14 patients had bleeding volumes of ≤30 mL, with the mean among the remaining 6 patients being 44.67±24.67 mL. The mean number of postoperative days in hospital was 13.3±3.6 days in the VH group and 5.6±2.64 days in the TVM group. When the first 20 patients treated by each surgical technique were divided into the first 10 and second 10 cases, operation and anesthesia times were significantly shortened in the second 10 cases compared with the first 10 cases in the VH group, but no significant differences were observed in the TVM group.

Conclusion. TVM surgery should be considered as a first-line treatment for patients with POP since it is relatively easy to perform compared with conventional operations. Surgeons intending to perform TVM surgery, however, should have a full understanding of pelvic anatomy and POP status and receive instruction from experienced surgeons before progressing to practical training.

Introduction

As Japan is becoming a super-aging society, with 1 out of every 5 people aged 65 years or older, the range of activities available for the elderly to engage in will become increasingly wider. Pelvic organ prolapsus (POP) can seriously affect women's quality of life (QOL) and carries an increased risk for surgery of up to 11% by the age of 80 years.[1]

Urinary incontinence (UI) is another urogynecologic disease that is closely associated with POP and its incidence also increases with age.[2,3] POP is treated by exercise therapy, pharmacological therapy, application of vaginal pessaries and other conservative therapies; however, all such therapies are non-curative and surgical therapy is eventually required. For POP, especially prolapsus uteri, gynecologists have conventionally performed curative surgical procedures such as vaginal hysterectomy (VH), anterior and posterior colpoplasty and circumferential suture of the levator ani muscle. There is no doubt that VH is a unique gynecologic surgical technique and an essential skill to be learned during gynecologic residency training. Meanwhile, recent reports from a group of French gynecologists have described tension-free vaginal mesh (TVM) surgery for the repair of POP by using a mesh that does not require hysterectomy.[4,5] In Japan, this technique was first adopted by urologists[6] and then by gynecologists. Since most women hesitate to undergo hysterectomy, the spread of the TVM technique, which enables uterine preservation, may lead to the uncovering of potential POP patients and provide a first-line surgical option for POP as a substitute for VH in the future. Unlike VH, in which surgical manipulation is performed under macroscopic observation, TVM surgery consists mainly of blind maneuvers and is thus associated with the risk of causing bladder or rectal injury. As a result, a supervising doctor may be hesitant to let inexperienced surgeons, such as gynecologic residents, perform the TVM procedure. While leaning a new surgical technique requires the understanding of pelvic anatomy and particular surgical techniques, as well as a certain amount of experience as an assistant surgeon, it is also essential to have sufficient opportunities to perform surgery in the capacity of an operating surgeon.

This study aimed to retrospectively compare operation time, total anesthesia time, intraoperative bleeding volume and number of postoperative days in the hospital between the first 20 cases each of VH and TVM surgeries performed by a first-time surgeon.

Correspondence: Dr. Haruhiko Kanasaki, Department of Obstetrics and Gynecology, School of Medicine, Shimane University, 89-1 Enya Cho, Izumo, Shimane 693-8501, Japan.
Tel. +81.853.202268 - Fax: +81.853.202264.
E-mail: kanasaki@med.shimane-u.ac.jp

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Materials and Methods

Among the female patients who underwent surgery for POP at the Department of Obstetrics and Gynecology of Shimane University Hospital, the first 20 patients on whom the primary author (HK) performed VH as the operating surgeon from June 2000 and the first 20 patients on whom the primary author performed TVM from July 2007 comprised the subjects of this study. Patient medical charts and anesthetic records were retrospectively reviewed by the primary author for operation time, anesthesia time, bleeding volume, number of postoperative hospital days and postoperative readmission, and data analysis was subsequently conducted.

Before July 2007, all POP patients who were classified above POP quantification (POP-Q) stage II underwent VH at our hospital. In the VH group, 4 patients were POP-Q stage II and 12 and 4 were POP-Q stage III and IV, respectively. Nineteen patients underwent VH with anterior and posterior colpoplasty and circumferential suture of the levator ani muscle, and 1 patient (POP-Q stage II) who had undergone total hysterectomy underwent colpocleisis. The mean age of patients in the VH group was 70.6±7.37 years. After July 2007, TVM operations were chosen as a first line treatment for POP patients with a POP-Q stage of > II. After being given an adequate explanation on the risks and benefits of the TVM procedure and declaration that the TVM operation was started afresh in our department, patients chose

the TVM operation as treatment for POP after giving their signed consent. The mean age of the patients treated with TVH was 69.15±9.3 years. Eight patients with cystocele as the major problem (2 POP-Q stage II and 6 POP-Q stage III) underwent anterior TVM (A-TVM), in which mesh was inserted into the anterior vaginal wall only. Six patients with both cystocele and rectocele (1 POP-Q stage II and 5 POP-Q stage III) underwent anterior and posterior TVM (AP-TVM), in which mesh was inserted into both the anterior and posterior vaginal walls. Another 6 patients with vaginal stump prolapse following hysterectomy (2 POP-Q stage II and 3 and 1 POP-Q stage III and IV, respectively) underwent total TVM (T-TVM), in which a single prosthetic mesh consisting of two parts connected to each other was inserted into the anterior and posterior walls. There was no significant difference in age between the VH and TVM groups (Table 1).

Surgery was performed under lumbar spinal anesthesia in a lithotomy position, following general practice. VH surgery was performed by the primary author as the operating surgeon with the support of a senior surgeon. Although the senior surgeon served primarily as the first assistant and supervised and assisted in the procedure, the entire procedure was essentially performed by the operating surgeon. Similarly, TVM surgery was also performed by the primary author as the operating surgeon. For the first 3 cases, surgery was performed by the primary author with the support of Dr. Kazuaki Yoshimura from the University of Occupational and Environmental Health. Before performing VH surgery as the operating surgeon, the author had participated as the second assistant surgeon of the surgical team for about 20 cases. For TVM surgery, the primary author observed surgery performed by Dr. Yoshimura in 3 cases before performing it himself as the operating surgeon.

The TVM surgical technique has been described previously.[7] A monofilament polypropylene mesh (25×25 cm, Gynemesh PS; Ethicon, Somerville, NJ, USA) is cut into a similar shape as that used in the Prolift system (Ethicon). The procedure for the A-TVM begins with an anterior colpotomy. A full-thickness incision of the vaginal wall was done following sufficient fluid separation with epinephrine diluted 4×10^5-fold. Cystocele correction warrants bilateral transobturator passage of the mesh in order to suspend it. On either side, both arms of the mesh are passed into the paravesical region using a modified Emmet needle. The anterior sub-vesical strap is inserted into the arcus tendineus fasciae pelvis and the posterior sub-vesical strap into the arcus tendineus 1 cm from the sciatic spine. For the P-TVM to correct the rectocele and/or uterine prolapse, posterior colpotomy is performed longitudinally and the mesh is placed under the vaginal wall. On either side, one strap of the mesh is passed into the pararectal space through the sacrosciatic ligament to become exteriorized in incisions located outside and below the anus. The mesh is pre-cut and adjusted according to the type of correction required. Traction over the exteriorized arms of the sling ensures correct positioning. After cystoscopy and digital examination of the rectum, the colpotomy is closed with a 2-0 PDS running suture without additional colpectomy.

Operation time was defined as the time from the first incision to the completion of the last suture. Anesthesia time was calculated from anesthetic records prepared by anesthesiologists. Bleeding volume was calculated as the amount of blood aspirated or absorbed by gauze. Bleeding volumes of 30 mL or less were not considered measurable. The period of postoperative hospital stay was determined on the basis of a patient's postoperative course and micturition status, and not according to the type of surgery performed based on a critical path or other management tools. For the purpose of this study, the number of days to discharge was calculated with the day of surgery defined as day 0. Statistical analysis to determine significant differences between groups was performed using the unpaired t-test.

Results

We compared operation time, anesthesia time, bleeding volume and number of postoperative hospital days between the VH and TVM groups, each group consisting of the first 20 cases operated on by a first-time surgeon as the operating surgeon (Table 2). Operation time was significantly shorter in TVM than in VH surgery (88.70±22.65 min *vs* 113.65±29.44 min).

Total anesthesia time was also significantly shorter in TVM surgery (140.05±33.80 min *vs* 168.11±38.71 min).

Intraoperative bleeding volume was unmeasurable (≤30 mL) only in 1 patient in the VH group while the mean bleeding volume in the remaining 19 patients was 133.68±83.81 mL. In the TVM group, 14 of 20 patients had bleeding volumes of 30 mL or less, while the mean bleeding volume in the remaining 6 patients was 43.67±24.67 mL, which was significantly smaller than the that in the measurable patients in the VH group.

The mean number of postoperative days in hospital was 13.30±3.60 days in the VH group and 5.60±2.64 days in the TVM group, with the latter being significantly shorter than the former. To evaluate the degree of familiarity with each surgical technique, the VH and TVM cases were further divided into the first and second groups, with 10 cases per group, and compared with respect to

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Table 1. Background of vaginal hysterectomy and tension-free vaginal mesh patients.

	No.	Age (years)	POP-Q stage		
			II	III	IV
VH groups	20	70.60±7.37			
VH + colporrhaphy + suture of levator ani muscle	19	(58-83)	4	11	4
Colpoclesis	1			1	
TVM group	20	69.15±9.3			
A-TVM	8	(56-82)	2	6	
AP-TVM	6		1	5	
T-TVM	6		2	3	1

POP-Q, pelvic organ prolapsus (POP) quantification; TVM, tension-free vaginal mesh; VH, vaginal hysterectomy; A-TVM, anterior TVM; AP-TVM, anterior and posterior TVM; T-TVM, total TVM.

Table 2. Comparison of operation parameters between the vaginal hysterectomy and tension-free vaginal mesh groups.

	VH group (n=20)	TVM group (n=20)	P value
Operation time (min)	113.65±29.44	88.70±22.65	P<0.01
Anesthesia time (min)	168.11±38.71	140.05±33.80	P<0.05
Total bleeding volume (mL)	133.68±83.81 (n=19) unmeasurable (n=1)	43.67±24.67 (n=6) unmeasurable (n=14)	P<0.05
Postoperative hospital days	13.30±3.60	5.60±2.64	P<0.01

VH, vaginal hysterectomy; TVM, tension-free vaginal mesh.

operation time, anesthesia time and bleeding volume (Table 3). For the first 10 cases of VH surgery, the mean operation time, anesthesia time and bleeding volume were 128.50±31.11 min, 187.78±42.65 min and 168.0±72.54 mL, respectively, while those for the subsequent 10 cases were 98.80±19.30 min, 148.44±22.25 min and 95.56±82.33 mL (excluding 1 case with ≤30 mL). This result indicates that experience with the VH surgical technique in the first 10 cases led to significantly reduced operation time and anesthesia time, and significantly reduced bleeding volume in the second 10 cases. For the first 10 cases of TVM surgery, the mean operation time and anesthesia time were 88.80±21.76 min and 146.90±37.80 min, respectively, and were not significantly different from those for the subsequent 10 cases (88.60±24.68 min and 133.20±29.64 min, respectively). With regard to bleeding volume, there were 7 unmeasurable (bleeding volume ≤30 mL) cases each in the first and second groups while the mean bleeding volume in the remaining 3 cases was 30.67±11.55 mL in the first group and 50.67±35.23 mL in the second group, with no significant difference in bleeding volume depending on surgical experience.

Discussion

For treatment of POP, gynecologists have conventionally performed hysterectomy followed by correction of the urinary bladder position, removal of excessive vaginal wall, anterior and posterior colpoplasty and circumferential suture of the levator ani muscle. Due to the inclusion of hysterectomy, many patients have refused to receive surgical treatment and have therefore been treated conservatively with vaginal pessaries. Recently, a group of French gynecologists described tension-free vaginal mesh, a new surgical technique based on the concept of reconstructing the pelvic floor with a mesh,[4] and the technique is becoming increasingly popular in Japan. A randomized, controlled trial to compare TVM surgery with traditional VH surgery has demonstrated a notable superiority of TVM surgery in terms of anatomical cure rate.[8] TVM surgery is also associated with a relatively low rate of complications and thus can be performed safely.6 Therefore, this new surgical technique can also substitute existing surgical procedures and become the first-line option for Japanese patients with POP. Needless to mention, performing surgery in the capacity of an operating surgeon requires not only learning surgical procedures from textbooks, but also observing actual surgical procedures and acquiring experience as an assistant surgeon. The usual process is to complete a series of training programs before performing surgery as the operating surgeon. It is highly possible that traditional VH-based surgical procedures will become less popular in favor of TVM surgery, which will be performed in all POP cases in the future. Although it is true that the Federal Drug Administration (FDA) has warned of serious complications associated with transvaginal placement of surgical mesh in treatment for POP, at the very least, TVM surgery will become an essential surgical technique for the treatment of POP, and one that must be learned during gynecologic residency training. In the present study, we simply compared the first 20 cases each of VH and TVM surgeries performed carefully by a first-time surgeon. The first 20 cases of VH surgery were performed by the primary author 5 years after he graduated from medical school; the first case of TVM surgery was performed by the primary author 15 years after he graduated from medical school. Therefore, from the perspective of experience and basic techniques learned during the intervening periods, it is difficult to determine which surgical technique is superior. Nevertheless, we still believe that comparing two surgical techniques performed by the same first-time surgeon should enable us to evaluate their usefulness.

As shown in Table 2, comparison of the first 20 cases each of VH and TVM surgeries performed by the same surgeon revealed significantly shorter operation and anesthesia times in TVM surgery. With regard to bleeding volume, 14 of the 20 patients undergoing TVM surgery had bleeding volumes of 30 mL or less while the mean bleeding volume for the remaining 6 measurable patients was significantly smaller than that for patients undergoing VH surgery. This indicates that, even by a first-time surgeon, TVM surgery can be completed in a shorter operation time with a lower bleeding volume than VH surgery, the conventional surgical technique for POP. The mean number of postoperative days in hospital was longer than that in the TVM group. The VH operations in this study were performed from June 2000 to January 2006. During this period, we usually kept patients who underwent operation in hospital for almost 2 weeks to observe their recovery without postoperative complications. However, these days, we discharge postoperative patients as soon as possible if no postoperative problems are evident. We also divided the 20 cases in each of the VH and TVM groups into the first 10 and second 10 cases, and compared them with the same parameters (Table 3). The results showed that in VH surgery, the second 10 cases had significantly shorter operation and anesthesia times and significantly decreased bleeding volume compared to the first 10 cases, indicating that VH surgery is an experience-dependent surgical procedure where repeated performance of surgery leads to improved skill, shorter operation time and reduced excessive bleeding. In TVM surgery, no significant difference was observed in operation time, anesthesia time or bleeding volume between the first 10 and second 10 cases, suggesting that the TVM technique is not experience-dependant, and thus can be performed relatively easily and safely, even by a first-time surgeon.

No long-term outcomes for TVM surgery are available, and sufficient informed consent is required for performing mesh-based surgical techniques. Although the recurrence rate following the traditional surgical technique for POP has been reported as 29.2%,[1] the short-term recurrence rate following TVM surgery has been shown to be very low at 3-5%.[5] It is expected, therefore, that TVM surgery will be extensively performed in Japan, substituting traditional techniques for POP, such as VH, anterior and posterior colpoplasty and circumferential suture of the levator ani muscle. The

Table 3. Comparison of operation parameters between the first 10 and second 10 cases in the vaginal hysterectomy and tension-free vaginal mesh groups.

	VH group			TVM group		
	First 10 cases	Second 10 cases	P	First 10 cases	Second 10 cases	P
Operation time (min)	128.50±31.11	98.8±19.30	P<0.05	88.80±21.76	88.60±24.68	n.s.
Anesthesia time (min)	187.78±42.65	148.44±22.25	P<0.05	146.90±37.80	133.20±29.64	n.s.
Total bleeding volume (mL)	168.0±72.54 (n=10)	95.56±82.33 (n=9) unmeasurable (n=1)	P<0.05	30.67±11.55 (n=3) unmeasurable (n=7)	50.67±35.23 (n=3) unmeasurable (n=7)	n.s.

VH, vaginal hysterectomy; TVM, tension-free vaginal mesh; n.s., not significant.

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results of the present study also show that TVM could be completed within a shorter time than the conventional procedure, even by a first-time surgeon, which demonstrated the safety and low-invasiveness of the surgical technique. On the other hand, there have been reports of TVM-specific complications, such as formation of pelvic hematoma, bladder and rectal injuries, mesh erosion and coital disorders, which led to a FDA warning in 2008 (Vaginal Mesh FDA Warning: Serious complications associated with transvaginal placement of surgical mesh in repair of pelvic organ prolapse and stress urinary incontinence, 2008). Furthermore, it goes without saying that surgeons intending to perform TVM surgery should have a full understanding of pelvic anatomy and POP status and receive instruction from experienced surgeons before progressing to practical training.

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