

Transvaginal Natural Orifice Transluminal Endoscopic Surgery (vNOTES) hysterectomy in Singapore

Dear Editor,

Hysterectomy is one of the most common gynaecological procedures, and various approaches are available such as abdominal, laparoscopic and vaginal.¹ Several studies demonstrated that vaginal hysterectomy is preferable to laparotomy for superior surgical safety, less postoperative pain, and shorter hospital stay.^{2,3} However, its use is limited by large uteruses or narrow vaginal access, hindering surgical access to the upper uterine pedicles. Hysterectomy by transvaginal Natural Orifice Transluminal Endoscopic Surgery (vNOTES) is increasingly used as an innovative surgical technique in recent years. vNOTES uses the single-port approach via vaginal access to overcome the limitations of a narrow space and difficult access to uterine pedicles in vaginal hysterectomy.⁴⁻⁶ We introduced vNOTES in a tertiary centre in Singapore and aimed to discuss its technique and benefits.

Preoperative preparation. vNOTES was introduced in the Department of Obstetrics and Gynaecology, Singapore General Hospital, Singapore, in 2021. We reviewed the indication of the hysterectomy and preoperative imaging. Next, we performed an abdominal examination and a pelvic examination for non-*virgo intacta* patients. The patients were counselled about the vNOTES approach and consented to it. Exclusion criteria for vNOTES hysterectomy included those with dense pelvic adhesions, adnexal masses suspicious of malignancy or metastatic cancer that required debulking surgery. The surgery was done either by the senior gynaecological oncologist or trainees under his supervision.

Surgical procedure. Under general anaesthesia, the patient was placed in a lithotomy position, cleaned, draped and catheterised. Intravenous antibiotics prophylaxis was administered preoperatively. First, the surgeon grasped the cervical lip with vulsellum forceps and made a circumferential incision on the cervix. Next, sharp dissection was used to perform an anterior colpotomy, followed by a posterior colpotomy to enter the peritoneal cavity. Bilateral uterosacral and cardinal ligaments were clamped, cut and ligated with braided absorbable sutures (VICRYL, Ethicon Inc, Somerville, US). The cervix was routinely stitched close with VICRYL. One end of an XXS Alexis retractor (Applied Medical Resources Corp, Rancho Santa Margarita, US)

was inserted into the Pouch of Douglas (Fig. 1A), while the other end was inserted into the vesicovaginal space. The cervix would be within the retractor. Next, the retractor was attached to a sterile size 7½ left-hand glove, which served as the hand-made gloved port for single-port laparoscopy. Three 5mm ports and one 12mm plastic port were fitted into the thumb, little finger, middle finger and index finger sleeves, and secured with sutures to prevent air leak (Fig. 1B). Pneumoperitoneum was created in the abdomen with carbon dioxide. A 50mm 30-degree rigid laparoscope, conventional laparoscopic instruments and energy device (LigaSure, Valleylab, Tyco International Healthcare, Boulder, US) were used. LigaSure was employed for securing the uterine and upper pedicles. Ureters were visualised before ligating the infundibulopelvic ligaments. Specimens were retrieved vaginally. Once haemostasis was secured, the Alexis retractor was removed with the gloved port. The vault was closed with interrupted VICRYL.

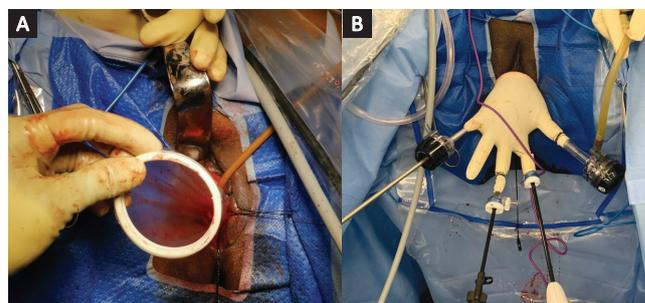


Fig. 1. (A) Alexis retractor inserted into the peritoneal cavity via the posterior colpotomy. (B) Handmade gloved port. Size 7½ left sterile glove is attached to the distal ring of Alexis retractor. Conventional rigid laparoscopic instruments are anchored to the gloves with an airtight seal.

Post-surgical care. The patients were allowed diet and received oral paracetamol or non-steroidal anti-inflammatory drugs for analgesias. Opioids were given if the woman had drug allergies.

Technique. We used a homemade gloved port rather than ready-made single-port devices used in other studies. Hayashi et al.⁷ evaluated that hand-made glove-ports were cost-effective, efficacious and appropriate in single-port surgery, which is also applicable for vNOTES since the technique was similar.

Learning curve and operating times. Wang et al. stratified cases into the first 20 and sequential 13 cases⁸

and suggested that the learning curve for vNOTES was steep, but it significantly improved with surgical experience. They reported significantly shorter operation time, less estimated blood loss and shorter hospital stay in the sequential 13 cases. The senior gynaecologist leveraged his vast experience in performing vaginal hysterectomies, laparoscopic surgeries including single-port laparoscopy, robotic surgeries, and oncological surgeries, to introduce vNOTES as a novel technique. Initial operating times could be prolonged due to the learning curve of the primary surgeon and the trainees, or complexity of the cases.

Preliminary outcomes. From February to July 2021, 15 patients underwent vNOTES hysterectomy, with either bilateral salpingo-oophorectomies or salpingectomies. Indications for surgery were uterine fibroids, adenomyosis, ovarian cysts, endometrial hyperplasia and carcinoma. None of the patients needed conversion to conventional laparoscopy or laparotomy. The mean age was 54.7 years old (range 39–72), and the average body mass index was 27.4kg/m² (range 19–38). Two were virgo intacta, 3 patients were nulliparous, 9 patients had previous vaginal deliveries, and 1 had 3 previous caesarean sections with ligation. There were no complications as of follow-up until December 2021.

Modifications to the technique. A posterior colpotomy was done first for cases where anterior colpotomy was difficult to perform due to adhesions. An Alexis retractor was inserted into the Pouch of Douglas while the other end was positioned anterior to the uterovesical fold. Pneumoperitoneum was created, and dissection of the uterovesical fold was performed under laparoscopic guidance. The retractor would be repositioned when the bladder was separated from the uterus.

Women with previous abdominal surgeries. Three women with previous abdominal surgeries had omental or bowel adhesions to the anterior abdominal wall. We avoided performing adhesiolysis as the vNOTES approach allowed direct access to the vascular pedicles. Hence, vNOTES eliminated the risk of complications from adhesiolysis such as postoperative ileus, bleeding or bowel injuries. Additional benefits include enhanced recovery through early feeding, ambulation and eliminating port-related complications, such as bleeding, infection and port-site hernias.

Obese women. With vNOTES, obese patients required less acute Trendelenburg position than

conventional laparoscopy due to easier visualisation of the pelvic organs. This reduced the impact on ventilation of the patient, hence, reducing anaesthetic risks.

Vaginal hysterectomy is difficult to perform in patients who are virgo intacta, nulliparous, have bulky uteruses or uteruses without prolapse. Furthermore, performing oophorectomies in the same setting can be technically challenging if the ovaries are drawn up abdominally due to anatomy or adhesions from previous surgeries.

In conclusion, the introduction of vNOTES allowed surgeons to circumvent the limitations of vaginal, laparoscopic and abdominal hysterectomies. Therefore, gynaecologists should consider this approach due to its benefits.

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