

## Transvaginal Laparoscopic Cholecystectomy (Hybrid NOTES Cholecystectomy)

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### Abstract

Natural orifice transluminal endoscopic surgery (NOTES) is usually performed by using a flexible endoscope. However, this instrument shows several limitations in the manipulation of intra-abdominal organs. Using the laparoscope instead of the flexible endoscope eliminates the need for new instruments and technical skills. We used conventional laparoscopic instruments for improving operative efficiency and single-port access (SPA) to prevent air leakage from the vaginal port. A 54-year-old female patient was admitted to our hospital with uterine prolapse and symptomatic gallstones. She underwent a transvaginal laparoscopic cholecystectomy. The transvaginal hysterectomy was performed after the cholecystectomy by a gynecologist. The operative time for the cholecystectomy was 86 minutes. She was discharged on postoperative day 8. This technique combines the advantages of NOTES and SPA surgery. We think that this technique can be easily performed from using laparoscopic instruments.

### Introduction

THE CONCEPT of natural orifice transluminal endoscopic surgery (NOTES) was introduced by Kalloo et al. as a promising technique to reduce skin incisions and postoperative pain.<sup>1</sup> NOTES can utilize various routes (i.e., transgastric, transvaginal, transvesical, or transcolonic)<sup>2</sup> and is usually performed with the flexible endoscope. However, endoscope has several limitations with regard to the manipulation of intra-abdominal organs, such as the gallbladder, appendix, stomach, or liver.<sup>3</sup> We used the laparoscope instead of the flexible endoscope. We applied a single-port access (SPA) system with surgical glove to reduce air leakage from the vaginal port. Transvaginal laparoscopic cholecystectomy with conventional laparoscopic instruments has all the possible advantages of NOTES and can overcome the limitations of NOTES. We performed the transvaginal cholecystectomy with a laparoscope and conventional laparoscopic instruments.

### Case Report

A 54-year-old female patient was admitted due to uterine prolapse and symptomatic gallstones. There were no abnormalities in preoperative laboratory findings. An ultrasonography of the abdomen demonstrated a gallstone 1.5 cm in size with a posterior acoustic shadow (Fig. 1). Under general anesthesia, the patient was positioned in the lithotomic position.

The vagina was cleansed with povidone-iodine 10%, and then the posterior part of the cervix was grasped with an Allis clamp. A Veress needle (STEP 14G; Tyco, Princeton, NJ) was inserted to make the pneumoperitoneum into a posterior cul-de-sac. In a steep Trendelenburg position, the vaginal walls were retracted laterally by two lateral retractors. After identifying the posterior fornix, a 2-cm incision was made at the cervicovaginal junction (Fig. 2). Under direct visualization, a sharp dissection was performed to open the posterior cul-de-sac. A wound retractor (ALEXIS wound retractor XS; Applied Medical, Rancho Santa Margarita, CA) was inserted into the posterior cul-de-sac with a surgical glove. One 10-mm trocar (Laport-10, 10 mm; InfraMed, Korea) and two 5-mm trocars (Applied Medical) were applied to a surgical glove to create a SPA system (Fig. 3). A 10-mm flexible laparoscope (LTF-VH; Olympus, Tokyo, Japan) was inserted through the 10-mm port. We used an articulating grasper (Reticulator Endograsp; Autosuture, Norwalk, CT) to retract the gallbladder and an articulating dissector (Reticulator Endodissect; Autosuture) to dissect Calot's triangle. The cystic duct and artery were identified and dissected, but a clip applicator (Endoclip, 5 mm; Autosuture, USA) was too short to ligate the cystic duct and artery. Inevitably, we inserted an umbilical port for the application of metal clips. We used laparoscopic cautery to perform the cholecystectomy. The gallbladder was removed through the vaginal port in an endobag (Lap bag; Inframed) (Fig. 4). The transvaginal hysterectomy was then

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**FIG. 1.** Preoperative ultrasonography showed gallbladder stones with a posterior acoustic shadow.

performed by a gynecologist. The operation time for the cholecystectomy was 86 minutes. There were no complications, except vaginal hematoma, owing to the vaginal hysterectomy. The vaginal hematoma was drained through the vagina. The patient was discharged on postoperative day 8 without incident. She was well 4 months after the operation.

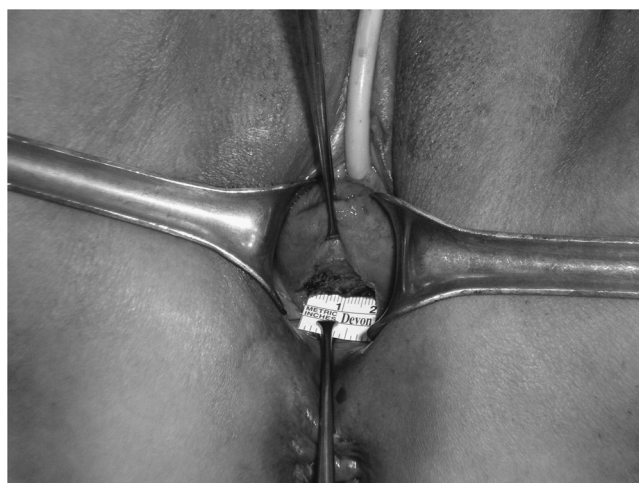
### Discussion

NOTES was originally described in an animal model.<sup>1</sup> With this report, NOTES has been developed as a promising technique in the field of minimally invasive surgery. NOTES has many advantages, such as improved cosmetic results, less pain, a shorter hospital stay, and fewer wound infections.<sup>2-4</sup> Various routes (i.e., transgastric, transvaginal, transvesical, or transcolonic) can be utilized for NOTES. However, routes other than the transvaginal approach have potential risks, such as contamination, fistula, and peritonitis. The transvaginal extraction of specimens has a low risk of pelvic infections and herniation.<sup>2,5</sup> It is possible to open and close the



**FIG. 3.** Single-port system with surgical glove.

transvaginal route safely and quickly under direct visualization, similar to umbilical open access for laparoscopic surgery.<sup>2,5</sup> Many researchers consider the transvaginal route to be safe and feasible for NOTES.<sup>2,5,6</sup> However, contraindications of the transvaginal route are prior to abdominal or pelvic surgery, history of endometriosis or pelvic inflammatory diseases, no previous pregnancy, and high risk of cardiovascular disease.<sup>5</sup> In our case, the patient was expected to undergo a total transvaginal hysterectomy, so we were able to use the transvaginal route. Originally, NOTES was usually performed with a flexible endoscope. The flexible endoscope has several disadvantages<sup>3,7,8</sup>: 1) It is hard to handle in the abdominal cavity, and obtaining traction for exposure of the operation site is difficult; 2) it is difficult to secure a clear operative view due to uncontrolled air leak in the pneumoperitoneum; 3) endoscopic vision is unsatisfactory, as compared to laparoscopic vision, and 4) most surgeons have little experience and find it difficult to manipulate a flexible endoscope. We used the flexible laparoscope and the conventional laparoscopic instruments, instead of the endoscope. It



**FIG. 2.** An incision was made on the cervicovaginal junction.



**FIG. 4.** The gallbladder was removed through the vaginal port.

was able to minimize the difficulty of manipulation, dissection, and retraction. In addition, we used the SPA system with a surgical glove, as previously reported by Hong et al.,<sup>9</sup> to maintain a stable pneumoperitoneum during the operation. This device can prevent subcutaneous emphysema, port-site infection, and bleeding.<sup>9</sup> We initially planned to perform a completely transvaginal SPA laparoscopic cholecystectomy. This technique has all the possible advantages of NOTES and SPA surgery. Dissection and retraction can be easily performed with conventional laparoscopic instruments. Cosmetic results are better than with the transumbilical single port. Our technique can avoid incisional pain and scarring in the umbilicus. However, after dissection of the gallbladder, we could not ligate the cystic duct and artery with a clip applier, as it was too short to reach the operative field. Thus, we had to insert an additional 5-mm umbilical port. Except for the 5-mm addition to the umbilical port for clipping, other aspects of the procedure were the same as for SPA laparoscopic cholecystectomy. If long instruments are developed and patients are selected effectively, we believe that this type of transvaginal laparoscopic cholecystectomy can be performed without any difficulties.

### Conclusions

This type of operation fuses NOTES and single-port surgery. We think this method has all the advantages of NOTES and single-port surgery, but further studies are needed to confirm the safety and indications of this procedure.

### Disclosure Statement

No competing financial interests exist.

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