

# A new technique for supracervical hysterectomy

## Anterograde vaginal subtotal hysterectomy

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### Abstract

To review the results of a novel method of subtotal hysterectomy, called anterograde vaginal subtotal hysterectomy (AVSH), and to compare them with those of laparoscopic subtotal hysterectomy (LSH).

We recruited 100 women with non-prolapsed uteruses and benign lesions of the uterus who required surgery. Of these, 60 underwent AVSH and 40 underwent LSH. Clinical data included average operation time, average volume of bleeding, postoperative anal exsufflation time, operative complications, average length of hospital stay and average hospital maintenance fee.

There were no significant differences in terms of average operation time, average length of hospital stay, or operative complications between the AVSH and LSH groups. The AVSH group showed early postoperative anal exsufflation ( $P = .000$ ), and had a low average hospital maintenance fee ( $P = .000$ ). The AVSH group showed a higher perioperative bleeding volume than the LSH group ( $P = .001$ ), which may be a result of the relatively amateur AVSH technique.

AVSH is a minimally invasive, safe and feasible surgical procedure, with favorable early postoperative anal exsufflation and a low average hospital maintenance fee.

**Abbreviations:** AVSH = anterograde vaginal subtotal hysterectomy, LSH = laparoscopic subtotal hysterectomy, VSH = vaginal subtotal hysterectomy, VTH = vaginal total hysterectomy.

**Keywords:** anterograde transvaginal subtotal hysterectomy, hysterectomy, laparoscopic subtotal hysterectomy, non-prolapsed uterus, transvaginal natural orifice transluminal endoscopic surgery

## 1. Introduction

Hysterectomy is a common gynecological procedure, performed in women with benign uterine conditions such as myoma, adenomyosis, or abnormal uterine bleeding (AUB). Hysterectomy is traditionally classified into 6 main categories: abdominal total hysterectomy, abdominal subtotal hysterectomy, vaginal total hysterectomy (VTH), laparoscopic total hysterectomy, laparoscopic subtotal hysterectomy (LSH), and laparoscopic-assisted total hysterectomy.<sup>[1]</sup> The minimally invasive surgical method of choice for subtotal hysterectomy has been LSH.<sup>[2–4]</sup> However, LSH has some disadvantages, for example, the risk of tumor cell dissemination caused by leiomyoma pulverization.<sup>[5,6]</sup>

For this reason, many gynecologists adopted laparoscopy-assisted vaginal subtotal hysterectomy (LAVSH) and transvaginal natural orifice transluminal endoscopic surgery (v-NOTES);<sup>[8]</sup> however, both are relatively expensive variations on the conventional approaches to minimally invasive surgical approaches for vaginal subtotal hysterectomy (VSH) have not shown great improvement.<sup>[7]</sup> Ten years ago, a gynecologist named Jia Zhen-Xiang pioneered anterograde VTH (AVTH) also called “Jia’s vaginal surgery” in China. This study describes the new surgical technique and reports on the safety and feasibility of anterograde VSH (AVSH) in comparison with standard minimally invasive surgery techniques for laparoscopic subtotal hysterectomy (LSH).

## 2. Materials and methods

**Patients:** Between January 2015 to September 2017, 60 patients underwent AVSH in our hospital. There were 38 cases of uterine myoma, 12 cases of adenomyosis and 10 cases of adenomyosis complicated myoma. These were enrolled in the AVSH group. Of the patients who had LSH in the five years from January 2012 to January 2017, 40 were enrolled in the study. There were 28 cases of uterine myoma, 10 cases of adenomyosis and 2 cases of adenomyoma with leiomyoma.

Patients were eligible for inclusion if they had a history of vaginal delivery, a non-prolapsed uterus, uterine size not greater than a 12-week gravid uterus, normal uterus on pelvic examination, normal Thinprep Cytologic Test and high-risk HPV test, no evidence of endometrial malignant lesion (confirmed by pelvic ultrasonography, uterine curettage and hysteroscopy if there is suspicion of malignant transformation), no history of gynecological surgery. Informed consent was

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Informed Consent: consent form was filled out by all participants.

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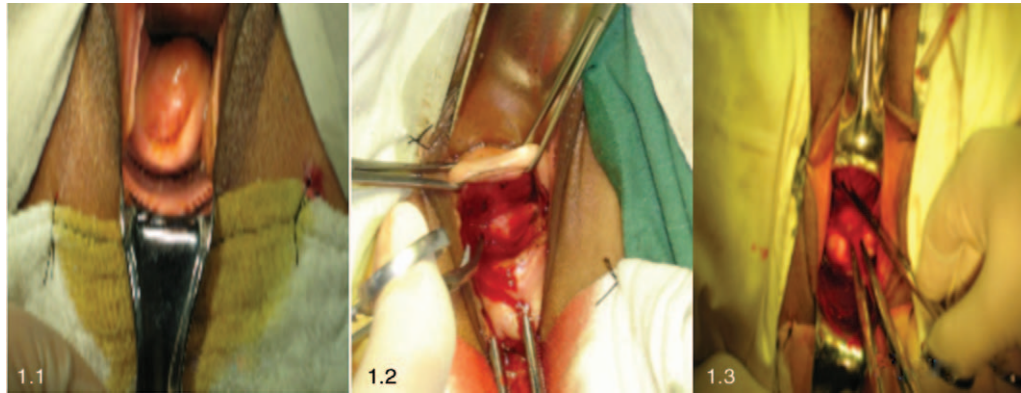
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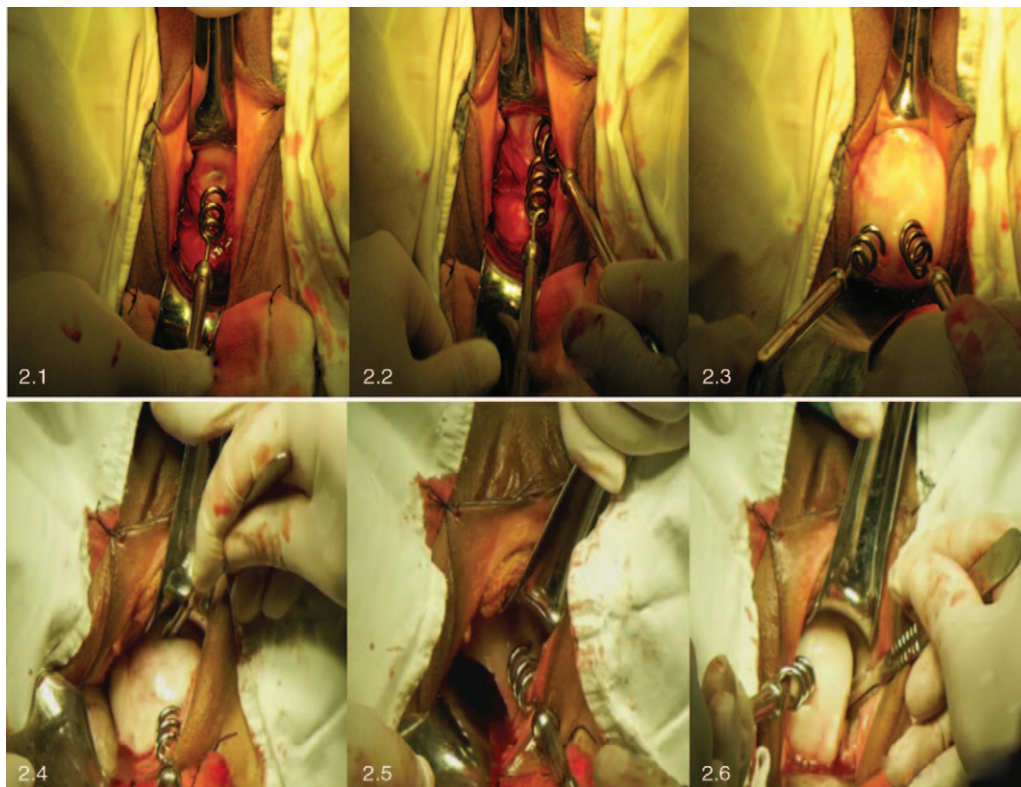
**Figure 1.** To open the anterior fornix of vagina and retroperitoneal bladder reflexion through vagina.

obtained from all patients. This study was approved by the ethics committee of the Zhe Jiang QuHua hospital. Clinical data collected include operation time, volume of bleeding, postoperative anal exsufflation time, the incidence rate of postoperative complications, length of hospital stay and average hospital maintenance fee. The hospital maintenance fee comprised operation costs, hospital bed fees, drug costs, medical consumable costs, nursing expenses, pathology, and anesthetic costs. The preoperative preparation was 3-days of vaginal washing with povidone-iodine solution and routine bowel preparation.

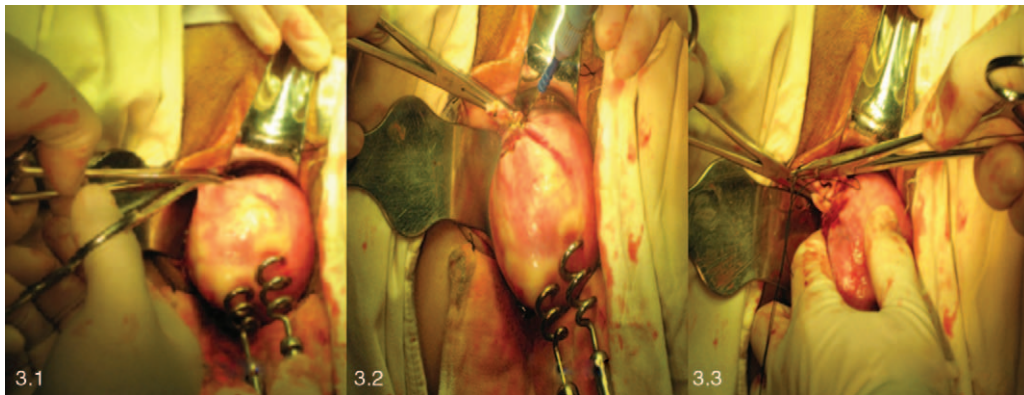
### **2.1. The key operative steps of AVSH**

**2.1.1. Step 1.** To expose the cervix (Fig. 1.1) a semi-annular incision between 0.5 and 0.8 cm is made in the anterior fornix of the vagina below the transverse sulcus of the bladder (Fig. 1.2). The uterovesical peritoneal reflection is exposed and excised to separate the vesicocervical space (Fig. 1.3).

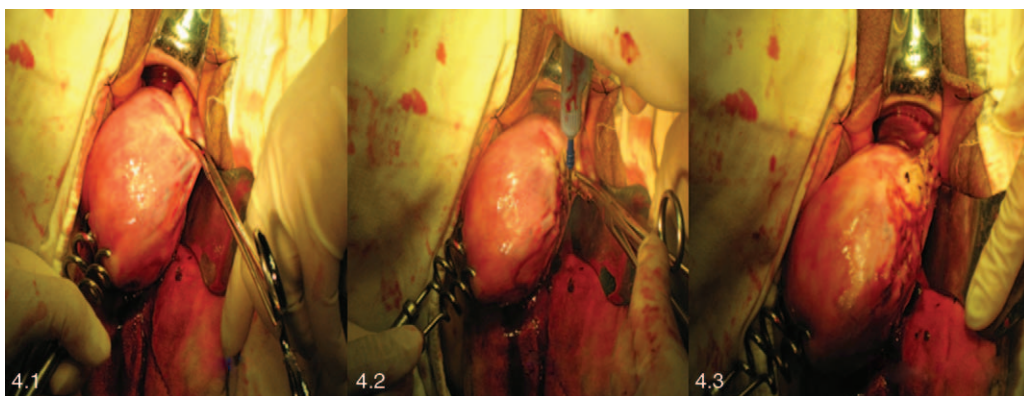
**2.1.2. Step 2.** A myoma screw drill is used to flip the corpus uteri (Figs. 2.1–2.3) and expose 1 or both of the uterine cornua. For a large uterus, myomectomy, dissection of fibroids or the corpora uteri is first performed using a screw drill (Figs. 2.4–2.6) if the turn-over maneuver proves difficult.



**Figure 2.** To flip the corpus uteri (Fig. 2.1–2.3) and dissect fibroids or the corpora uteri (Fig. 2.4–2.6) if the turn-over maneuver proves difficult.



**Figure 3.** To manage the right uterine ligament, fallopian tube and uterine artery and vein.



**Figure 4.** To manage the left uterine ligament, fallopian tube and uterine artery and vein.

**2.1.3. Step 3.** The uterine ligaments of the right cornua uteri including the round ligament, the isthmic portion of the fallopian tube, the uterine ligament and the uterine arteriovenous supply are reflected upward (Fig. 3).

**2.1.4. Step 4.** The same process as step 3 is performed on the left (Fig. 4).

**2.2. The surgical evaluation index**

The data collected included operation time (min), volume of bleeding (mL), postoperative anal exsufflation time (hours), average length of hospital stay (days), average hospital maintenance fee (RMB) and the incidence of operative complications.

**2.3. Statistical analysis**

SPSS version 19.0 (SPSS Inc, Chicago, IL) was used for statistical analysis. General characteristics were analyzed and presented in means ± standard deviation ( $\chi^2 \pm s$ ) and the incidence of operative complications (%), using the paired-samples test and Pearson Chi-Square Test. A *P*-value of <.05 was considered significant.

**3. Results**

In terms of baseline data, differences between the AVSH group and LSH group in terms of age, body mass index, menopausal state and size of the uterus were not statistically significant. The groups were therefore comparable (Table 1).

Comparison of the operation evaluation indicators showed no significant differences between the groups in terms of average

**Table 1**  
Comparison of general situations between 2 groups ( $\chi^2 \pm s$ ).

| Groups         | Cases | Age (yr old) | BMI (kg/m2)  | Parity (times) | Size of uterine (pregnant wk) |
|----------------|-------|--------------|--------------|----------------|-------------------------------|
| AVSH group     | 60    | 48.68 ± 5.23 | 22.16 ± 1.37 | 1.37 ± 0.49    | 8.73 ± 0.99                   |
| LSH group      | 40    | 48.03 ± 4.70 | 21.86 ± 1.92 | 1.53 ± 0.51    | 8.33 ± 0.89                   |
| <i>T</i> value |       | 0.645        | 0.920        | -1.570         | 2.099                         |
| <i>P</i> value |       | .522         | .360         | .120           | .038                          |



**Table 2****The comparison of operation evaluation indicators between 2 groups ( $\chi^2 \pm s$ ).**

| Evaluating indicators                  | AVSH group (n=60) | LSH group (n=40)   | T      | P    |
|--|-------------------|--------------------|--------|------|
| Average operation time (min)           | 74.33 ± 15.09     | 84.80 ± 20.54      | -2.938 | .080 |
| Average volume of bleeding (mL)        | 54.17 ± 28.03     | 38.43 ± 10.51      | 3.858  | .001 |
| Postoperative anal exsufflation (h)    | 24.93 ± 7.02      | 38.43 ± 10.51      | -7.706 | .000 |
| Average length of hospital stay (d)    | 5.80 ± 0.97       | 5.95 ± 1.19        | 0.689  | .492 |
| Average hospital maintenance fee (RMB) | 6226.18 ± 1052.79 | 13314.20 ± 2226.39 | -21.73 | .000 |

RMB = Chinese yuan (CNY).

**Table 3****The comparison of operative complications between 2 groups (n %).**

| Groups   | Cases | Injury of bladder | Postoperation of fever | Stump haemorrhage and hematoma | Injury of vaginal wall | Total complications |
|----------|-------|-------------------|------------------------|--------------------------------|------------------------|---------------------|
| AVSH     | 60    | 1 (1.67%)         | 2 (3.33%)              | 1 (1.67%)                      | 2 (3.33%)              | 6 (10.00%)          |
| LSH      | 40    | 0 (0.00%)         | 5 (12.50%)             | 3 (7.50%)                      | 0 (0.00%)              | 8 (20.00%)          |
| $\chi^2$ |       | -                 | -                      | -                              | -                      | 0.154               |
| P value  |       | -                 | -                      | -                              | -                      | .695                |

operation time (min), average length of hospital stay and the overall incidence of operative complications ( $P < .05$ ). However, the AVSH group had a higher average volume of bleeding ( $t = -3.585$ ,  $P = .001$ ), early postoperative anal exsufflation time ( $t = -7.706$ ,  $P = .000$ ) and a lower average hospital maintenance fee ( $t = -21.372$ ,  $P = .000$ ), than did LSH (Table 2).

The incidence of operative complications in the AVSH and LSH groups showed bladder injury in 1 case and 0, respectively, postoperative fever in 3 and 5 cases, respectively, stump hemorrhage and hematoma in 1 and 3 cases, respectively, and injury to the vaginal wall in 2 and 0 cases, respectively (Table 3). The overall complications did not differ between AVSH and LSH groups ( $\chi^2 = 0.154$ ,  $P = .695$ ).

#### 4. Discussion

SVH was originally described by Doderlein and Kronig in 1906, but did not gain popularity until the early 1990s with the introduction of laparoscopic surgery. Since gaining recognition, several groups have reported successful case series.<sup>[9,10]</sup> Their experience showed that SVH was very feasible;<sup>[10,11]</sup> however, due to the limits of vaginal space, SVH was only practical for uteri equivalent to 12 to 14 weeks of pregnancy in size.

The AVSH, based on the traditional surgical procedure of vaginal hysterectomy, may appear impractical to surgeons used to the conventional approaches. A Chinese gynecologist, Zhen-Xiang Jia, from ShangDong Province, developed an unconventional VTH technique called “anterograde vaginal total hysterectomy” (AVTH). The method gained popularity, especially in the central regions of China.<sup>[12-13]</sup> In particular, it dealt with the key difficulty of uterine corpus “switchover” with a purpose-made instrument called “screw drill” based on the level principle (Figs. 2.1-2.3). It also easily reduces the uterine body using a “screw drill” for myomectomy or dissection of fibroids or the corpora uteri (Figs. 2.4-2.6) when the turn-over maneuver proves difficult because of large-sized uterus. It simplified the surgical procedure for VTH and it was a natural progression to apply this to subtotal hysterectomy.

LSH is a popular minimally-invasive technique with the advantages of low average volume of bleeding, early postopera-

tive recovery, short anal exsufflation time, and a low postoperative complication rate compared to the traditional abdominal subtotal hysterectomy.<sup>[2,4]</sup> VTH and vaginal natural orifice transluminal endoscopic surgery are reasonable alternatives for benign uterine diseases.<sup>[5,14]</sup> Numerous studies have found that VTH is superior to laparoscopic total hysterectomy and it is the preferred operation according to current guidelines.<sup>[15,16]</sup> However, VSH has been infrequently studied with few available reports.<sup>[10,11]</sup> The principal problem of VSH is the difficulty in mobilizing the entire uterus into the vaginal introitus, especially for large uteri or cases with fibroids. However, AVSH completely solves this problem, because it can easily dissect the corpora uteri (Figs. 2.4-2.6) using a “screw drill.”

This study is the first report of AVSH. We found that the AVSH group did not differ significantly from the LSH group in terms of operation time, average length of hospital stay and the overall incidence of operative complications. The AVSH group also experienced early postoperative anal exsufflation time ( $P = .000$ ). This study, however, showed a high average volume of bleeding ( $P = .001$ ) in the AVSH group than in the LSH group, in line with findings of previous studies.<sup>[17]</sup> Further analysis suggests that the main cause may be relatively unskilled AVSH surgical technique that can be an issue when confronted with a large-sized uterus or uterine fibroids. The process of “flipping” of the corpus uteri can cause the laceration of the vaginal wall. AVSH is an ideal NOTES technique,<sup>[14,6]</sup> consistent with the minimally-invasive surgical approach of SVH. It avoids the risk of tumor cell dissemination caused by uterine comminution<sup>[6,18,19]</sup> according to the no-tumor-cell-dissemination principle of surgery. This study also showed that AVSH is an economical and practical surgical procedure with lower average hospital maintenance fee ( $P = .000$ ) than that of LSH.

The results of this study are consistent with results of other studies.<sup>[20]</sup> Although the rate of total postoperative complications showed no significant differences between groups, the rate of cervical stump hematoma in the AVSH group was lower than that of the LSH group (1.67% versus 7.50%). This was possibly caused by differences in surgical approach between AVSH and LSH, with the former requiring cervical ligation and the latter, cervical suture. In theory, AVSH does not involve opening the

pouch of Douglas, therefore the chance of injury of the rectum is very small. The risk of bleeding may be reduced and bladder damage may be increased in theory. Nevertheless, the incidence of bladder damage was very low, only 1.67%.

## 5. Conclusion

AVSH is a safe, feasible, economical, and practical surgical technique with early postoperative anal exsufflation time, low average hospital maintenance fee, and a low rate of cervical stump hematoma. There were no differences in average operation time, average length of hospital stay, and the overall incidence of operative complications, compared with LSH.

## Author contributions

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Statistical analysis: Zi-Jun Li, Ya-Qin Zheng.

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